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Electric Lighting.

THE PROGRESS THAT HAS BEEN MADE—ITS ECONOMY, CLEANLINESS AND HEALTHFULNESS AS COMPARED WITH GAS—THE ADVANTAGES OF ITS USE IN ALL BUILDINGS OF A PUBLIC NATURE—ITS USE IN LARGE MERCANTILE ESTABLISHMENTS, HALLS AND LIBRARIES A GREAT BENEFIT—A REVIEW OF THE VAN DEPOELE SYSTEM AND THE SUPEROIR ADVANTAGES CLAIMED FOR IT—A GREAT CHICAGO INDUSTRY.

The advances that have been made in the system of electric lighting, although not inconsiderable during the past few years, have really not been so great in the electric light itself as in the popular favor with which it is regarded. The public is becoming more and more accustomed to it as the months pass by, and to its use, and are therefore acquiring greater confidence in the mode of producing light. Some one has made the remark that "electricity and gas are playing a see-saw game, and that as the electric light goes up, the gas goes down." Be that as it may, for the two lights must and will stand on their respective merits. There is this to say about the electric light, which has come to be admitted in all circles where the electric light has been made a scientific study: The electric light does not vitiate the air. The purity of the electric light for the transaction of business, the selection of colors, and the daily avocations of life is simply superb. The cleanliness of the light is one of its greatest merits. It emits no smoke; but probably its greatest advantage is to be found in the influence it exerts on health. We all know that air is vitiated to a certain extent by the mixture of carbonic acid with it, and it has been shown that to be consistent with health there should be not more than six volumes of carbonic acid in ten thousand volumes of air. When the proportion reaches ten volumes to ten thousand the action of the heart is affected, when the proportion runs higher headaches occur, and in higher proportions rheumatism and bronchitis are the consequences. Where the electric light has been applied in hospitals, all these causes of trouble have been greatly mitigated, and in some cases have altogether ceased. Not only is the health of the subject improved, but in places where men are gathered in large numbers for work, it has been found that they are able to accomplish much more labor in a given time from the influence of this pure light than from the light of gas. Electricity as a substitute for gas is not a delusion; it is practicable. It supplies a real want. In the article which follows we have, at considerable pains and expense, made a number of beautiful engravings of the Van Depoele electric lamps and lighting apparatus, with a full description of the same as illustrative of the best development of this industry which we take great pleasure in presenting to our readers.

There has been for two years past plants of the system in successful operation in many of the leading cities of the Northwest. Among the places where this company has recently placed its lights are the following:

Flint, Jackson and Lansing, Michigan; Moorhead, Winona and Crookston, Minnesota; Lincoln, Jacksonville, Rockford, Streator, Elgin, Joliet and Freeport, Illinois; Laporte, Indiana; Bismarck and Sioux Falls, D. T.; Dubuque and Muscatine, Iowa; Amtigo, Wausau and Milwaukee, Wisconsin.

For the lighting of cities where this system is in use, to wit: Elgin, Ill., Winona and Moorhead, Minn., it has received the highest praises by all who have seen it, and they say without reserve that it is performing its duty in the most satisfactory manner, and that it is as steady and strong as any other light. The committee recently appointed by the city council of Grand Rapids, Mich., for the purpose of investigating the various systems of electric lighting, as applied to the illumination of streets, after at horough and unbiased survey of some sixty cities, returned from their labors and reported in favor of the Van Depoele light, and recommended the adoption of this light for their city.

On account of the increasing demand for this system in the Eastern States, the management have decided to establish headquarters at New York, Boston and Philadelphia, and we understand that a branch office will also be opened at San Francisco, for the purpose of facilitating the handling of the Western trade. Nineteen plants of the Van Depoele system are now working in the city of Chicago, and all are giving good satisfaction.

The following cuts illustrate some of the distinctive machines of this company:

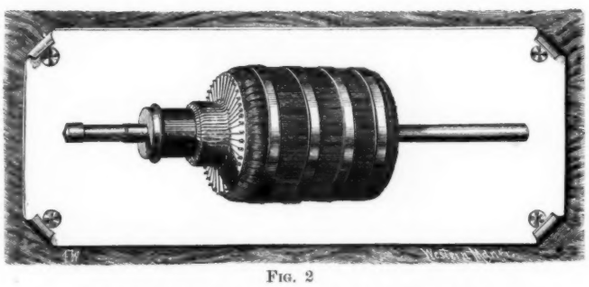

FIG. 2

FIG. 3.

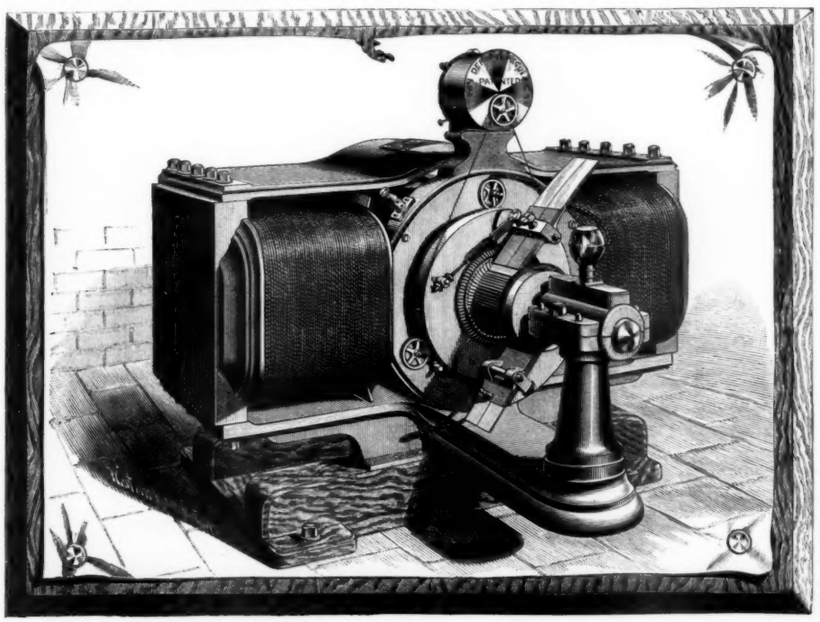

FIG. 1

ARC LIGHT.

The arc light is by far the cheaper and more available for all large spaces, such as shops, mills, etc. The least economical is the incandescent. By the very best lamps and generators yet invented is produced less than 160 candle-power per horse-power; while by their system of arc lighting they easily produce 2,000 candle-power per horse-power—over twelve times the light produced by the best system of incandescent lighting.

DESCRIPTION OF THE VAN DEPOELE SYSTEM.

The main features of the Van Depoele dynamo consist in the peculiar disposition of the field magnets, the construction of the armature, and the extreme simplicity of all parts of the apparatus (it having fewer parts than any other dynamo made); great compactness, and above all, the ease of management and control of the current to the work called for. Fig. 1 shows the dynamo with automatic current regulator. The principal parts of the dynamo are:

THE FIELD MAGNETS.

consisting of two large coils of copper wire wound around two soft iron cores, their north and south poles facing each other, and between these poles revolves the armature. The soft iron cores of the field magnets are cast on one end to heavy back plates, while to the other end are secured the semi-circular pole pieces between which the armature revolves in close proximity to the latter. The back plates of the magnets are secured between top and bottom plates, holding the whole in position and making a most solid frame. To the lower plate and in its center, which is neutral, are cast two extensions upon which are placed the posts or bearings supporting the armature shaft; this disposition allows the posts to be comparatively short, providing a very rigid support for the revolving armature. Further, the whole frame may be considered as a very long electro-magnet with its poles inverted towards the center.

THE ARMATURE.

Fig. 2 forms the most important part of the machine, and consists of a frame made of a number of iron bars, each separated

from the other; these bars are riveted to the inner and outer periphery of two metal rings, several of these rings being placed between the inner and outer layer of iron bars. And, finally, the rings and bars are riveted together so as to form a solid frame. The difference between this form of core and the Pacinotti or Gramme ring will be apparent at a glance. The Gramme ring is composed of several layers of soft iron wire coiled one upon the other, forming the armature core, upon which the copper wire is ultimately wound in sections; the magnetism of the field can act but very little or not at all upon the copper wire coiled on the inside of the ring thus made since this wire adds only to the resistance of the machine, without doing any service in the production of useful currents, the only effective portion of the wire being that close to the field and on the outside of the ring

Whereas the Van Depoele armature being built up of several rings—distanced one from the other—and the bars also distanced one from the other, an opening is thus provided all along and around the whole core. It will readily be seen, therefore, that the magnetism of the field can easily reach the wire wound on the inside of the cylinder, or armature, making every inch of wire in this armature pass under the direct influence of the field of force, thus accounting for the great efficiency of the Van Depoele dynamo.

Another and very important advantage offered by this construction is that these bars being wound (each couple of bars with one section of wire) and the iron bars not touching one another, the magnetization and demagnetization of the same is effected instantaneously and adds to the efficiency of the machine, since all local action is thus avoided.

It is entirely unnecessary with this armature to provide for ventilation, since there is no heat generated therein, and hence a great saving of power is effected compared with other machines which act as fans and require considerable power simply to keep up the ventilation.

THE COMMUTATOR

is made up of a large number of copper sections securely held together and connected to the coils of the armature (see Fig. 2). The brushes and their holders (see Fig. 3) are made substantial, easily handled and adjusted, and with proper management these parts wear very little. In some cases, with proper attention, these brushes have required no attention or trimming for three months' continual use.

ONE GREAT ADVANTAGE THE VAN DEPOELE DYNAMO POSSESSES IS

that any number or all of the lights may be turned off or on as desired, the current regulating itself to the work to be done; the power consumed to drive the dynamo will at all times correspond to the number of lights or other devices in circuit or in operation. The eighty-light machine runs from eighty arc lights down to three or four with an exactly corresponding amount of power to the lights in operation.

The lights can be turned off or on with the same ease as gas.

Up to sixteen lights the regulation of the current in the machine is obtained by a peculiar mode of winding; the whole or any number of lamps can be turned on or off at will; at the same time the machine will produce current only for so many lamps as are burning, consequently the dynamo requires only power corresponding to the work being done. This regulation requires no automatic arrangements whatever, and is perfect in every respect. They call this dynamo the compensating; in appearance it is like the other dynamos shown. For larger dynamos, from twenty to seventy or eighty lights in one circuit, the regulation leaves nothing to be desired—in all cases the machines only taking power according to the number of lamps burning. The regulation of these machines can be accomplished by hand or automatically. The hand regulation is used wherever the same or nearly the same number of lights are usually burning; a current indicator shows at all times the current strength, and by turning the brushes either up or down, on the dynamo, the production of current can be varied at will. However, in cases where the number of lights run on the same line is often varied, an automatic current regulator can be applied to the machine as shown in Fig. 1. This device controls the production of current to perfection without the slightest manual attention.

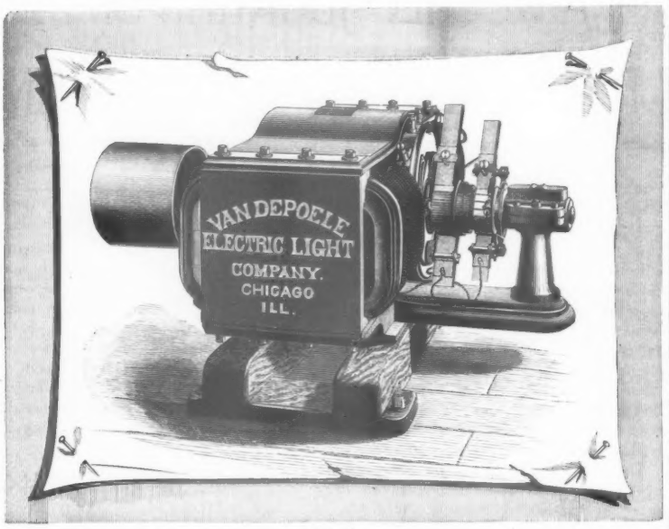

Fig. 4.

In the Van Depoele system of arc lighting great care has been exercised to keep the electromotive force of the current down as low as possible, reducing to a minimum the danger attending the operation of large plants. Even with their largest machines any lamp or any part of the circuit may be touched with impunity, and never yet have they met with an accident caused through the current of their machines; something which very few companies can boast of. Thus the current of these machines being of low tension and great quantity (intensity) burns short arcs in the lamps, producing an absolutely white light, reproducing perfectly the solar spectrum; whereas in all other lights, where high tension is used and long arcs kept up, the color of the light is decidedly purple or bluish, and although the violet rays hurting the eye and appearing to be brighter than the yellow, yet on photometric test it will invariably be found that the short arc and yellow rays have at least twenty-five per cent. more dispersive power than the violet. Another advantage of their short arc system is that their light is perfectly steady, while the long arc of other systems keeps the light dancing and fluttering around continually, to the great discomfort of those under its rays. Fig. 4 shows the dynamo endwise.

THE VAN DEPOELE NEW STANDARD ARC LAMP.

The principal features of this lamp (see Fig. 5) are two electro-magnets, one in the main and one in the shunt circuit; to the latter is hinged a soft iron armature, the free end of which moves under the influence of the opposite pole of the main magnet. This armature carries the carbon lifter, so that any motion imparted to the armature under the influence of its electro magnets, is directly communicated to the lifter, either separating the carbons or allowing the same to feed. One other and most important feature of this lamp is, that it needs no adjustment after it is made, thus doing away with all tampering by attendants, which has in many cases caused the failure, within a short time, of a good many plants. This lamp is provided with an automatic and hand cut-

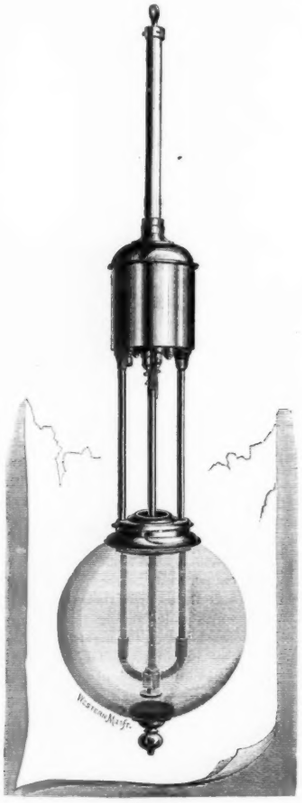

Fig. 5.

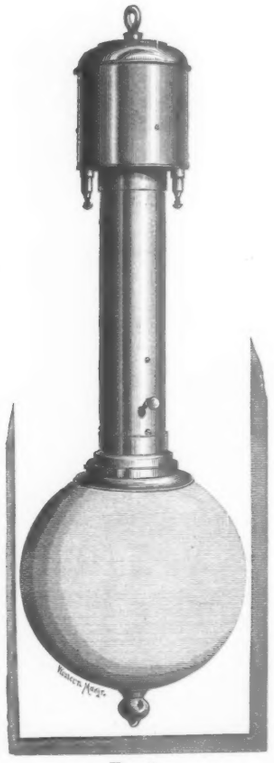

Fig. 6.

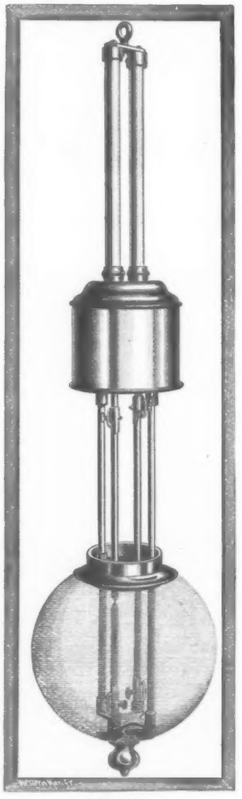

Fig. 7.

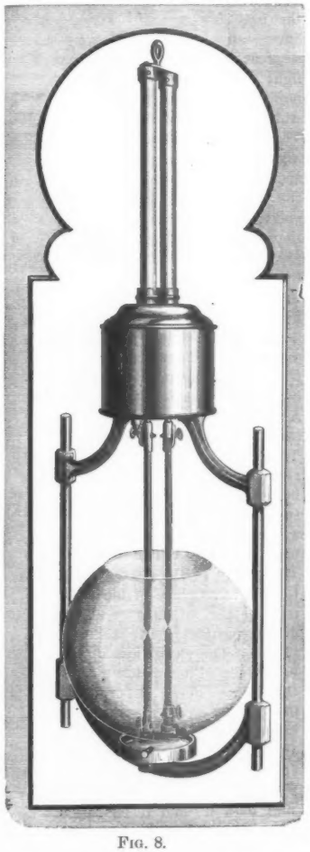

Fig. 8.

out, so that any lamp can be cut-out or in circuit without affecting the others. All parts of this lamp are very plain, and are not many; but are all made absolutely accurate with special machinery. All parts are interchangeable; not a single delicate part being present in the whole lamp. It will stand all the tests to which an electric arc-lamp can be subjected, without getting out of order. The workmanship cannot be surpassed; the design, simple and neat.

FIG. 16.

Fig. 6 represents the Van Depoele Universal Lamp. This lamp is intended to be used wherever an ordinary lamp could not be introduced successfully—on high and exposed places, such as towers and the like, or in places where there is much dust, dampness, etc. This lamp has no rod, the carbons being held in place and fed by an endless copper belt. This belt is actuated by a small electric motor, simple in construction, and placed on the top of lamp. This lamp can be placed horizontally or turned upside down without in the least affecting the proper feeding of the same. Carbons twenty-four inches long can be used in cases where long hours run are needed. Their universal lamp is certainly the most perfect arc lamp in the market, and is provided, in a nut-shell, with all the requirements of a perfect lamp. The same can also be made ornamental if desired.

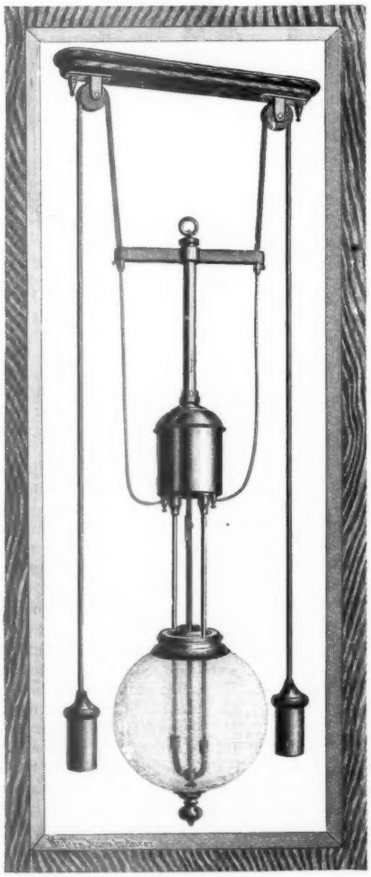

FIG. 9.

Fig. 7 shows their Double-Service Hanging Lamp, running sixteen hours without replacing carbons, and is intended to be used in shops or other places where whole night illumination is required. All parts are simple, solid, and not liable to get out of order.

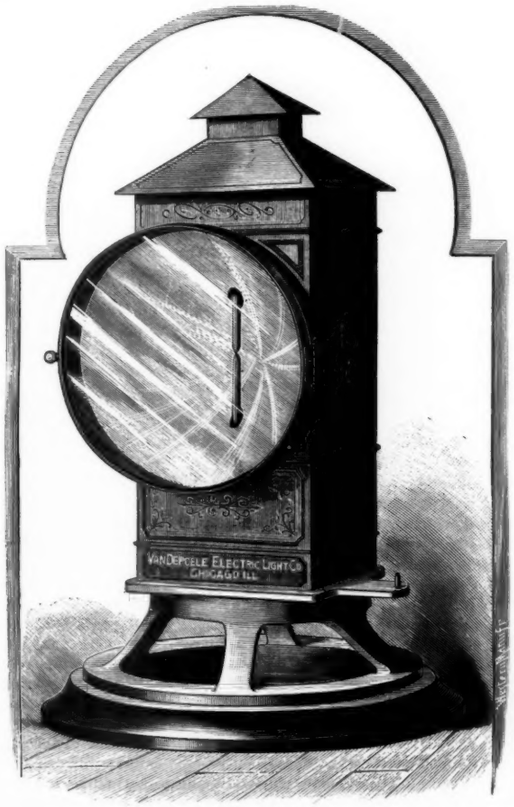

FIG. 11.

Fig. 8 shows their Double Lamp, sixteen hours' service, intended to be placed on high poles, such as are used in street lighting, etc. This lamp is provided with a solid frame by which it is held in position; in other particulars it is similar to the one shown in Fig. 7.

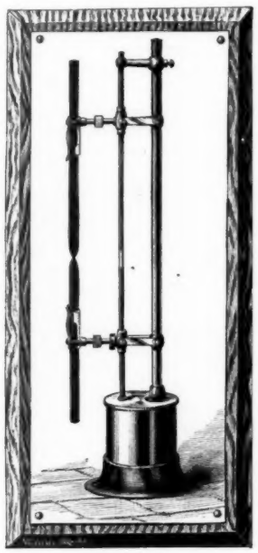

FIG. 13.

Fig. 9 shows a very convenient and safe means for raising and lowering lamps to replace the carbons. It consists of a wooden plate screwed securely to the ceiling. Upon this plate are fastened two pulleys provided with binding posts, to which the circuit wires are connected. Over these pulleys are placed two cables, attached to the lamp binding posts, and to the other free ends are hung weights counterbalancing the lamp, so that the lamp remains at any height you wish to put it. This avoids the carrying around of the step ladder, which is very annoying, especially in much frequented places, such as hotels, etc.

Fig. 10 shows the Van Depoele Patent Current Regulator, Automatic Switch, and Current Indicator combined, the whole contained in one frame, with all parts in sight and easy of access. The function of the combination apparatus is: First, to indicate correctly the condition of the current, whether one lamp or the whole number the generator can supply are running, showing at once if anything wrong is going on along the line, or with the generator, so that no matter how long the service line, at any time can the condition of the working circuit be seen.

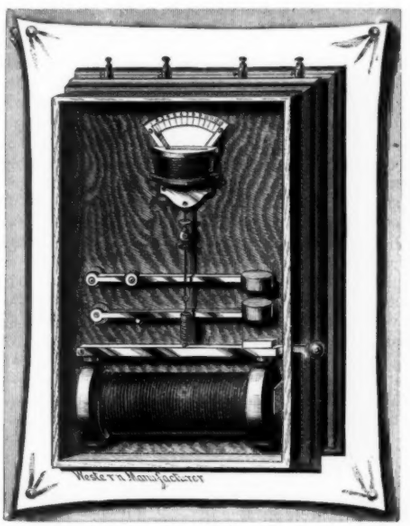

FIG. 10.

The second function of the apparatus is the automatic switch; in case of accidental breaking of the main or working circuit, the automatic switch lever, which was at first kept down by the electro-magnet in the main circuit, is now carried upward and breaks circuit, with the current, which energizes the fields of the dynamo, thus preventing any further current to be generated, and saving the machine harmless.

FIG. 12.

Fig. 11 shows a special headlight and lamp

for steamboats and locomotives, warranted to be unaffected by the most severe vibrations. The peculiarities of this lamp are that the carbons are few, and regulated by an electric motor contained in the lamp. No delicate parts are present, and no adjustment whatsoever is needed to the lamp. When the dynamo runs with normal speed it is impossible to keep the carbons at any other distance apart, while emitting light, than that to which the lamp is made. On putting the carbons together, they are immediately separated, while, when pulled apart further than the normal distance, they will be moved toward each other until the proper distance is obtained. The feed of the carbons is most perfect, consequently a perfectly steady light is the result. The lamp is enclosed in a neat and solid case, and is so arranged that it can be turned to any angle desired; for this purpose the lamp and case are carried by a rotary platform, and so arranged that it can be worked by the wheelman or pilot from his post.

The Van Depoele Company manufacture especially for steamboats a portable lamp, which can be hung up in a few moments in any part of the boat, or can be placed on shore if needed. This lamp is provided with the same feeding mechanism as the preceding lamp, and can be run from eight to sixteen hours without renewal of carbons. This lamp is in general appearance similar to Fig. 6.

Fig. 12 shows their Focusing Lamp for the use of the lecture room. The lamp is mounted upon a very solid stand, and can be moved horizontally and vertically to any desired angle. The working of the lamp is perfect and reliable, and any candle power can be given, from five hundred to twenty thousand or more. The reflectors used in conjunction with these lamps have to be chosen to correspond with the work to be done. Any range from one mile to ten can be furnished or manufactured to order.

Fig. 13 represents the Focusing Lamp proper, as is contained in the case shown in Fig. 12.

POWER REQUIRED TO RUN THE ELECTRIC LIGHT.

The power required to drive a dynamo will be in direct proportion to the number and the size of lights given, although some machines take a great deal more power than others. In some machines the construction of the armature is such that the heat produced in the iron core would in a short time burn the insulation of the copper conductor around the same, were it not that some ventilating device is used to keep the high temperature down; some armatures being made very much like blowing-fans. The power spent in producing this air blast is an absolute loss; it is avoided and not at all needed in the Van Depoele dynamo. Their armature, after a sixteen-hour run, is as cool as when started. Thus it will be seen that this is one cause at least which will account for the difference in power required to produce a certain amount of current.

The following are a few facts, giving an idea of the power their machines take, and how they compare with others:

A test was made in their works with three forty-light dynamos, driven by a New York Safety Steam Power Company's engine with a 12x12 cylinder, at 250 revolutions per minute, the dynamos running at a speed of 700 revolutions per minute. One machine was turned on after another, and 120 lights like stars were blazing for over an hour, while the test lasted. This engine is rated by the company manufacturing the same as seventy-five horse-power.

In the Milwaukee Industrial Exposition, where they have sixty large size arc lights, run by a Reynolds-Corliss engine, cards were taken a number of times, and indicated invariably forty-five horse-power for the sixty lights.

In the Sherman House, Chicago, where this Company has a twenty-light plant, a large number of cards have been taken, and the average power is fifteen horse-power for the twenty lights.

In J. V. Farwell & Company's, Chicago, cards have been taken by Mr. Morovia, Civil Engineer, indicating that the forty-light machines require very near three-quarters horse-power per light, or thirty horse-power for the forty lights. The twenty-five-light machines in the same place show also an average of three-quarters horse-power per light.

ELECTRICAL TRANSMISSION OF POWER.

The Van Depoele dynamo is peculiarly adapted to the transmission of power. In trials made during the month of February, 1883, a motor weighing 300 pounds was placed on a car capable of carrying twenty-five people; a similar dynamo was run at the works, which furnished by means of copper conductors the current to operate the motor on the car. Trials were made for several days, and with perfect success; the car being filled to its utmost capacity, was run back and forward with the utmost ease; the incline of the track varied from $\frac{1}{8}$ to $\frac{5}{8}$ inch to the foot, the car and its load being often stopped on the steepest incline, and held there for a time, and then again started up grade with the utmost facility. the motor responding with promptitude to the manipulation of the switch, by means of which the direction of motion is reversed and the power controlled. During the Inter-State Industrial Exposition held at Chicago, in the fall 1883, an elevated railway car was run, and with a control that convinced the most skeptical. Thousands of people have enjoyed the ride every day of the show. Another illustration of the transmission of power might not be out of the way here: In the month of November, 1883, one day about 11:50 A. M., the engine running their factory broke down completely, the piston rod becoming disengaged from the crosshead, smashing things around generally. No sooner was the situation taken in than a 30-horse-power generator was put in place so as to be driven by the independent engine, which is only used for testing machines and lamps, but not at all in communication with the shafting of the factory; a second machine or motor was placed in position so that from its pulley a belt was run to a pulley on the factory shaft. Two No. 6 wires were now run from generator to motor, and from motor back to generator; the generator was started by the testing engine, and immediately the motor which was belted to the main shaft driving the machinery started up, and was put at proper speed; all this was done in about thirty minutes, and at 12:30 P. M. the factory was running as usual, and this has lasted for over three weeks, until the engine had been repaired.

During all this time the power was perfectly steady, and no attention but a few drops of oil was required to the motor. We may safely state that it is only a question of a short time when the distribution of power by electricity will become general. In a great many instances where water power is available, advantage can be taken to transmit power over great distances. This company also manufactures electric motors of all sizes, from a sewing machine motor up to any desired horse-power required.

Fig. 14 represents a small motor intended for sewing machines or other light work. Fig. 15 shows the battery used to run it.

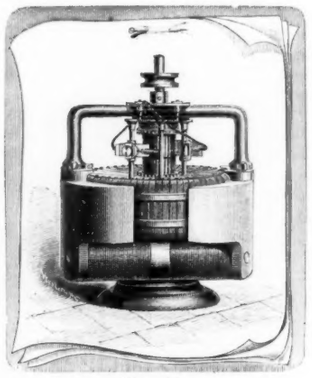

FIG. 14.

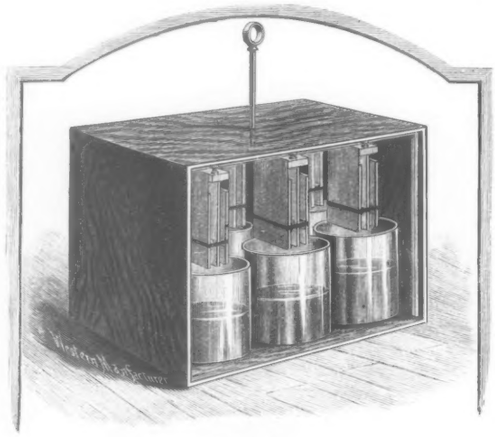

FIG. 15.

ELECTRO-PLATING MACHINE.

The company are prepared to furnish electro-platers (see Fig. 16) of any size to order. Electrotypers and electro-platers are especially invited to send in their orders, or to call at their manufactory. This machine is by all odds the most compact one in the market, and is free from heating.

THE INCANDESCENT LAMP.

Fig. 17 shows the incandescent lamp used by the Van Depoele Electric Light Company, which they will be ready to introduce in the market immediately.

Most of the patents granted in the United States on electric lighting have been for special construction. This company have used great care in applying for patents to patent only something new, and on as broad principles as possible.

THE ADVANTAGES CLAIMED

Are: Extreme simplicity in construction in all parts of the system; no intricate machinery nor delicate devices being used.

Ease of management and attendance to dynamo while in operation.

Perfect control of the current to run a given number of lights from one up to the full capacity of the machine.

Perfect safety in handling the lamps while the current is on.

The light produced is absolutely white and steady.

The almost total absence of the violet rays makes their light more diffusive than any other.

Having fewer parts to their dynamos than any other machine made, the wear and tear is reduced to a minimum.

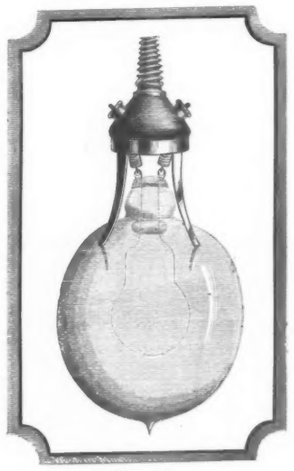

FIG. 17.

In places where a large amount of light is wanted, their light is certainly cheaper than gas, and the larger the plant the more economical the light.

The whole of the apparatus is made of the best material obtainable, and the workmanship is thorough in all particulars. This accounts for the great success of their plants. Not one single plant of theirs has been out of use a day for over a year.

Having in the foregoing sketch presented quite fully the Van Depoele system of electric lighting, so that our readers may fully understand the merits that are claimed for it, a few words in the way of general observation may not be considered inappropriate. While we have said at the outset that the advances which have been made in electric lighting are not so much in the light itself as in the popular favor with which it is regarded, it is nevertheless true that the system which is under consideration has been greatly improved since the inventor first turned his attention toward its more complete and more perfect development. It has not been for the purpose of making the distinction between the electric light and gas light invidious that we have made comparison between the healthfulness of these two lights, but it is for the purpose of stating what men who have made the two modes of lighting a study known to be a scientific fact, that the healthfulness of the electric light exceed that of any other artificial light known. While America has made wonderful progress in electric lighting, we should not lose sight of the fact that this mode of lighting is making far greater progress in Great Britain and on the Continent than it is in our own country, for the simple reason, perhaps, that the great practical usefulness of the light seems to be more generally acknowledged and appreciated there than in this country. In London, a few years ago, the city appropriated a very large sum of money to put the electric light to a practical test as to its superiority in point of economy in lighting the streets of that city at night, as well as a number of the great public institutions in the city. The experiment was a great triumph in favor of the use of electric lighting for the purposes required, and since then has been more generally adopted than in any other city, not even excepting Paris, where electric lighting is coming into such general use. The British Museum in London, the House of Parliament, the Albert Dock on the Thames, and the great Mersey Dock at Liverpool, also the Picton Gallery in the latter city, are all brilliantly lighted with electric lights; while the great libraries which are so frequently met with in many of the large cities of Europe are lighted by the same agency. Every one who has had any experience knows how exceedingly irksome it is to undertake to read in any of our hotels by gaslight, and how greatly the pleasure is enhanced when the electric light takes its place. The time is surely not far distant when the great advantages in every point of

(Concluded on page 10.)

ELECTRIC LIGHT NEWS

—— The Panhandle road is fitting up a train of passenger cars with the electric light.

—— Contracts have been given out for the immediate installation of three isolated electric light plants in Quebec.

—— "The Brush-Swan Electric Light Company, Norfolk, Va., have ordered the third tubular boiler set with the Jarvis furnace, and will use the Sheffield grate bars to burn screenings for fuel."

—— The Royal Electric Company, of Montreal, has secured the contract to furnish the Peterborough Electric Light Company, of Peterborough, Ont., with a complete 75-light Thomson-Houston plant.

—— The Citizens Electric Illuminating Company of Brooklyn, has, after long delay, been authorized by the city government to run its wires, and will at once put in one hundred Thomson-Houston lights.

—— The Canadian Pacific Railway steamers Arthabasca, Algoma and Alberti, which will be the finest on the lakes, are to be equipped with the Edison light throughout. Each will have a 6½x8" Armington & Sims engine to drive the dynamos.

—— A local Brush-Swan electric light company has been formed at Auburn, N. Y. The directors are J. A. Cook, J. W. Dunning, J. A. Fowler, E. D. Clapp, E. M. Birdsall, C. A. Smith, B. C. Smith, E. M. Avery, and J. E. Allen.

—— Contracts have been entered into for putting the Edison light into Nourmahal, Mr. Astor's steam yacht, now approaching completion. The Armington & Sims Company are at work on the engines, which will drive the dynamos.

—— The Boston Post-Office was wired and fitted with Edison lights early in the winter, but it was not until within about a week or ten days that it went into operation. It works perfectly, and is a great boon to the clerks, who have had to work in an atmosphere heated and vitiated by gas.

—— The Schuyler Electric Light Company is well established in Hartford, being handsomely backed by local capital represented by Mr. Geo. M. Bartholomew, President of the Charter Oak Life Insurance Company. The company has a fifteen-light plant in successful operation in Ansonia, run by water power.

—— The Thompson-Houston lights have made a marked impression in Sacramento, Cal. A number of capitalists have organized a strong company, and after testing the system in Sacramento have ordered 150 more lights to their existing plant of 50. There are some good fields for operations on the west coast, and the Pacific Company will doubtless find and work them.

—— The New Orleans cotton exposition building will be lighted with incandescent lamps, and will require 15,000 lights and 1,800 horse-power. To light with the arc system will require 700 lamps and 700 horse-power to operate the dynamo. The total steam required for lighting and for Machinery Hall will be at least 3,000 horse-power. In this estimate is included the power for five arc lights of 36,000 candle-power each, which will light the grounds. These are the largest single lamps ever constructed.

—— The Jarvis Engineering Company, Boston, Mass., have received orders to fit up a complete steam plant for the Jenney Electric Light Company, Brockton, Mass. They will furnish two 30 H. P. Armington & Sims engines. The boiler will be set with the Jarvis patent furnace, and use Sheffield grates to burn screenings for fuel. They will use the Deane steam pump, with the Korting injector as auxiliary feed; also use the national feed water heater to utilize the exhaust steam. It is the intention to add a third engine later.

The French Scandal.

The principal actors in the "domestic drama" which has recently attracted so much attention in Paris will doubtless be recollected by many persons connected with electric lighting in this country. MM. Savary and Lamy came to England some time ago in the interests of an electrical company, and made themselves known in quarters where they had reasonable hopes of disposing of shares. A telegram from the Paris correspondent of the *Daily Telegraph* on Monday contained the following particulars: "Some unfavorable light is thrown upon the antecedents of M. Savary, the ex-deputy, fired at the other day in a restaurant by M. Lamy, whose wife he had taken away. The magistrate charged with the duty of investigating the matter has seized several letters which passed between M. Savary and Madame Lamy, as well as between the ex deputy and other persons connected with him in the establishment of companies of a rather shady character. The Company of Electricity was started by M. Savary at Lyons, whence it was transferred to St. Etienne. At St. Etienne Savary hired a shop next door to the branch office of the Credit Lyonnais, and here he first installed an exhibition of pictures and artistic curiosities. Hither came, soon after, a staff of persons to assist in the work connected with the exhibition, these consisting of a Belgian engineer named Eck, an accountant, M. and Madame Lamy, and several special workmen. The exhibition was magnificently illuminated by electricity every evening, and attracted great attention at St. Etienne. Some days afterwards M. Savary issued shares in his company, but, although a good many persons put down their names as subscribers, no one deposited any money at the chief office of the Electrical Power Company, with the exception of one woman, who entrusted M. Savary with 175f., which she saw no more. The premises of the sham company at St. Etienne are now empty, but M. Savary's creditors have seized whatever goods they found in the place, and he has been ordered to resign his office as mayor of a commune in the Manche, which department he formerly represented in the Chamber of Deputies."—*London Electrical Review.*

Telpherage.

Professor W. E. Ayrton, lecturing recently in the theater of the Royal Dublin Society House, upon "Telpherage, or the Automatic Electric Transport of Goods and Passengers," said that certain difficulties involved in using steam locomotive engines for pulling trains along overhead wire ropes were solved by the use of an electric engine. The latter needed no store of fuel, and therefore required no driver, and by the use of a form of block first suggested by Prof. Perry and himself, matters could be so arranged as to render it absolutely impossible for one electric train on a telpher rope to run into another. Telpherage constituted the same sort of improvement on the old overhead wire rope railway that the present system of steam locomotives did over the old wire-rope railway. For light overhead lines a single wire rope or rod or rail should be used, and the load should be small and much subdivided. By sending a number of electric trains one after the other, large quantities of merchandise might, however, be conveyed. There was at present a telpher wire at Weston, Hertfordshire, consisting of a one-inch rope on which in 20 hours close on 2,000 tons per day of 20 hours could be delivered each way. The lecturer by means of models explained the mode of propelling the electric locomotive along the wire rope, and also the means of blocking, by which, when a series of trains are on the ropes, and if a breakdown occurs in the foremost one, the hinder trains are prevented from running into it. One advantage that the electric transmission of goods had over any other system was that the wire rope could give off electric power at any point for other purposes. If a telpher line were employed by a farmer to carry his crops of wheat to the farm, he could, by attaching the wires of an electric plough or threshing machine to any part of the telpher line, at once obtain power to work them. A telpher line crossing yard of a factory would not merely carry goods from one part of the yard to another, but would furnish power for drilling, sawing, and other operations. Another advantage of telpherage was, that it would enable them to avail themselves of stores of power that were at present running to waste. They had a splendid example of that, thanks to the energy, the patience, and the confidence in electricity possessed by their own countryman, Mr. Traill, in the Portrush Railway, where water-power was employed to produce the electric current. He had been informed by Mr. James Perry, a county surveyor in Galway, and the brother of his colleague, that in consequence of the failure of the milling trade in Ireland, splendid water-powers, including wheels and machinery, could be had in various parts of the country for a merely nominal rent. Here was a means effecting the cheapest possible carriage of goods running to waste; therefore the mistake should not be made in Ireland of building railways in places where coal was very dear. In such districts the possibility of introducing electric railways and telpher lines should be carefully considered. A plan had been devised by his colleague and himself for diminishing leakage of electricity in electric railways by dividing the line into sections, and this principle of subdivision of the line could be applied to telpher lines by means of a system of contact boxes placed along the line, the operation of which was to turn on the electricity to the section the train entered, and turn it off from the section it had just left. Telpher lines would, of course, not displace railways, but they would be feeders to railways; they would convey goods where it would not be worth while to make a railway, and they would be used in loading and unloading ships. In the Crimean War the British soldiers died of cold in the trenches because there were no means of conveying great coats from the sea coast to them. He hoped to see the day when an advancing army would construct a field-telpher wire, just as they now constructed a field-telegraph, by means of which stores and ammunition could be sent with ease and rapidity to the front; and he trusted they would all live to see the day when "to telpher" would have become a common English expression.

Electric Lights for the Streets.

The effort to cut down electric light service in the public lighting of this city has entirely failed. As this is owing to strong public sentiment it is a matter for congratulation.

It is not a triumph for any particular company or interest as opposed to the gas companies. It is merely a tangible expression of the soundness of the position as voiced in the *Bulletin* recently, namely, that the electric arc lamp is the cheapest street light if as much light is desired. The large gas lamps are undoubiedly more expensive, as the trials of the past year have shown.

There is a large number of petitions now before the city government for electric light. Both Charleston and East Boston are desirious of more light for the streets in those districts. Contracts will be made with the companies during the month of May, and it is probable that when this has been done the petition for more lights will be acted upon. The appropriation for electric lighting as first proposed was $94,006, which would about maintain the present service without the desired increase. As finally passed the appropriation was increased to $125,000. The average cost of lighting at present prices is $239 per lamp per year. This appropriation would therefore provide for about 525 lamps. The number now in operation is 381. It will thus be seen that there is provision for an increase of about 140 lamps, or about twenty-five per cent. This will guarantee better lighting during the ensuing year than Boston has ever had. —*Boston Commercial Bulletin.*

ELECTRICAL AND SCIENTIFIC

* * Brooklyn has 3,000 miles of overhead wire strung on 5,817 poles.

* * M. Marcel Deprez has been elected a member of the French Academy.

* * The British Government have decided to ask for the appointment of a Select Committee of the House of Commons to examine into and report upon the whole subject of overhead telegraph and telephone wires.

* * Tests made by Mr. Geo. A. Hamilton, electrician of the Western Union Telegraph Company, show that the American Insulator Company's Double-Petticoat Insulator reduces the resistance on thousand-mile circuits down to that of city line circuits, consequently effecting a great saving of battery power. Its prevention of leakage commends it especially to electric light companies.

* * It is remarked that in certain dynamos the cores of the electro-magnets gradually heat up, and their temperature continues to rise after the machine has stopped working. Various explanations have been offered for the latter peculiarity, one being that the draught created by the machine in working keeps the temperature down by carrying off heat, whereas when the machine stops the draught ceases. Others suppose that the Foucault currents, or the magnetic friction causing heat, do not cease to operate on the stoppage of the machine. The cause of the heat, whether magnetic friction or Foucault currents, is a moot point, and MM. Warburg and Hönig have recently made experiments which lead them to conclude that it is mainly due to magnetic friction. A core of iron was carefully magnetized by a coil, and the heat generated was exactly measured in an ice calorimeter. If the heat depended only on the electrical resistance of the iron to the circulation of Foucault currents, and, if the coercive force of the iron was zero, the authors argued that they could calculate the heat generated by two cycles of magnetization. This they did; but the calorimeter showed a very different result, and MM. Warburg and Hönig have been led to the conclusion that nearly 75 per cent. of the heat generated is due to magnetic friction.

* * At a recent meeting of the Philosophical Society of Glasgow, Professor Jamieson said he had obtained some specimens of nearly pure aluminum wire from the Aluminum Crown Metal Company, the same being prepared by Webster's process. On analysis, the wire gave 98.39 per cent. of aluminum, 1.24 per cent. of iron, and 0.37 per cent. of silicon, the specific gravity being 2.786. As the wire was only in short lengths, he had been compelled to determine the electrical resistance of the metal by the "fall of potential" method with chemically pure copper wire as well as with a standard B. A. unit; and he had found that the aluminum had 1.96 times the resistance of the copper wire of the same gauge and length, and but little more than half the resistance of pure copper for the same length and weight. The conclusion arrived at, therefore, was that aluminum had by far the least resistance of any known metal for its weight.

In the course of his investigations he had elicited a very curious fact, namely, that the introduction of a very small percentage of aluminum into copper not only raised its tensile strength immensely (the specimens shown having a breaking stress of about 45 tons per square inch), but also enormously increased its resistance. So far as his tests had gone, the specimens shown had a resistance of 25 times that of pure copper. He pointed out the probable uses of such wire, as, for example, in the construction of high resistance coils. Other qualities might be found well adapted for telephone wires, and the purer kinds of aluminum, owing to the great lightness of the metal, could be used for military purposes, in which lightness of baggage was an important desideratum.

Telephonic News

⁂ Hudson River Telephone stock sold this week at 98½, and American Bell Telephone Company's at 163.

⁂ The New York and New Jersey Telephone Company have over 3,000 miles of wire and 5,800 poles in use in Brooklyn.

⁂ The Bell Telephone Company, of Halifax, have submitted to the council a tender for operating the City Fire Alarm.

⁂ The council of the town of Levis, Province of Quebec, are about to adopt a system of telephonic connection which will answer the purpose of a police and fire alarm system.

⁂ The several police stations in New York are still relying largely on the old dial telegraph instrument for intercommunication. Great bodies move slowly, but they will come to the telephone in time.

⁂ The ordinary Blake transmitter is now used in the operating room of the Boston Exchange. The more sensitive instrument formerly used proved too delicate, and was too easily thrown out of adjustment.

⁂ Fire came uncomfortably near the Boston office of the New England Telephone Company one day last week, but did not reach it. The Boston Exchange has had quite enough fire for some time to come.

⁂ On Thursday, the 10th ult., there were 2,087 calls made to the Bristol (England) Exchange. These calls represent 4,174 communications, or an average of thirteen communications per subscriber for the day, which works out into 3s. 10d a week, or three-fifths of a penny per message.

⁂ D. M. Clower, Esq., superintendent of the Northern Division of the Erie Telephone Company at Dallas, Texas, has resigned to enter into other business at Dallas. Mr. Clower was very popular in north Texas, and has made a very efficient superintendent. The employes of his division presented him with a gold-headed cane as a mark of their esteem.

⁂ The subscribers to the Hamburg Telephone Exchange have been much exercised by a communication received from the Postal Telegraph Department at Berlin, in which they are informed that the amount of subscription is no longer to be fixed according to the direct distance of the aerial lines, but according to the distance actually traversed by the wires.

⁂ Much trouble would be avoided if telephone exchange managers would take pains to have some one give every new subscriber a practical lesson in talking through the telephone. People naturally get the idea that if they are not heard they must talk louder, which generally makes matters worse. It is as absurd as to imagine that a foreigner who does not understand English will "catch on" if you only speak it loud enough.

⁂ Just after the meeting of the New England Bell Telephone Company in New York, last week, those present were invited to go up into the experimenting room and talk over the copper circuit to Boston, which had been working beautifully all the morning Just as they reached the room the whole thing gave out, owing, as it was ascertained afterward, to the breaking of the cable across Harlem River by the steamboat Maryland, which dragged over it at high tide.

⁂ Col. Parker, the superintendent of the Boston Exchange is a bit of a wag, and given to saying bright things. Meeting a gentleman the other day who had recently severed his connection with an electric lighting company to return to his old profession of journalism he accosted him with: "You are the first instance on record of a man's giving up the electric light and *going back to gas.*' The Colonel would make his fortune as a paragrapher.

⁂ The Telephone Company of Canada have applied at Quebec for letters patent.

⁂ Two schemes of telephonic communication between the different departments and establishments of Portsmouth, England, Dockyard were a few months back submitted to the Admiralty, who have just approved of the least expensive proposals. As a result, some of the principal buildings will not have that easy and constant means of communication which telephony would have afforded.

⁂ The North Pennsylvania Company have now 2,200 regular exchange subscribers and 3,000 sets of instruments in use. The territory embraced by the company is large, covering the following counties: Cameron, Clearfield, Centre, Clinton, Columbia, Blair, Lycoming, Sullivan, Union, Snyder, Northumberland, Juniata, Huntingdon, Mifflin, and Montour, together with Lackawanna, Luzerne, and Wyoming, the counties operated by the North Pennsylvania Company, making a total of eighteen counties.

⁂ The *Freeman's Journal* says: "There is not a town, we believe, in England where the telephone service is cheaper or better than in Dublin. In London, if we mistake not, the charge is £25 for a service here given for £12. It is, therefore, satisfactory to find that the shareholders do not lose by their liberality, but are rewarded by a steadily-increasing business. Every original preference shareholder is now receiving six and a-half per cent. on his investment, fairly earned out of profits, with a substantial sum carried over."

⁂ An interesting telephonic experiment was tried at Birmingham last week, during the political demonstrations in that town. Mr. R. Harding Milward, who lives at Bromsgrove, a distance of twelve miles from Birmingham, conceived the idea of inviting a few friends to his house to hear the speeches of Lord Randolph Churchill and Colonel Burnaby by telephone, and the experiment was successful beyond all anticipations. Not only was every word of the speakers heard, but every ejaculation by the audience; and by the tone of the voice the listeners had no difficulty in distinguishing who was speaking. There were three receivers used—one in front of each of the side galleries near to the platform, and one suspended at the corner of the chairman's desk, immediately under Lord Randolph Churchill when he was speaking. At the other end were four transmitters, so that four listeners at a time could hear all that was going on.

⁂ Commenting upon the damage done by telephone companies' employes, when fixing wires to the roofs of buildings, an Edinburgh journal makes the following observations: "Nobody can question the utility of the telephone as a means of rapid inter-communication, and business men, as a rule, are ready to offer every facility for the expansion of the system by allowing wires to be carried over their premises; but telephone companies, after all, are private concerns, established as much for the benefit of their promoters as for the public who choose to employ them, and their operations must, to some extent, be carried out on the give-and-take principle. There has been at times a disposition to ignore the private rights of individuals. Looked at from the company's view, it may be desirable to cover a man's premises with a complete network of wires to secure the most direct communication from one point to another; but the owner of the premises should at least have some control in the matter, and not be expected to concede a privilege which by usage may be established as a right. We know that in some instances the pretensions of these companies have been successfully resisted without appeal to courts of law, but it has been when good sense has prevailed, and owners' private rights have been recognized by the payment of a nominal sum for the concession. It is in these cases a matter of arrangement, and it is to be commended as a reasonable means of avoiding obstacles which may otherwise be interposed to the simplest and most economical expansion of the telephone system."

Report of the Directors of the New England Telephone and Telegraph Company.

BOSTON, MASS., May 1st, 1884.

To the Stockholders:

The New England Telephone and Telegraph Company was organized under the laws of the State of New York, in the month of October, 1883, and was formed by the consolidation of companies which had formerly operated Maine, New Hampshire, Vermont, and all of Massachusetts, except the south-eastern part.

ADVANTAGES OF CONSOLIDATION.

Some of the companies which went into this consolidation had been in operation five or six years, and were pioneers in the business. The union of these various interests was the outcome of a strong conviction on the part of those interested in telephone matters, that it was for the best interest of all concerned to bring a large territory under one management. This has been the tendency for several years, and while such organizations may have to pass through periods of experiment and trial, yet we feel certain that the results reached will demonstrate the wisdom of such action Among the advantages of consolidation of companies and the operation of large territories under a single management may be mentioned the reduction of expenses, uniformity of rates, more prompt and easy connection and communication over longer distances, and an entire avoidance of the confusion and other inconveniences, both to the public and to the management, resulting from the operation of various independent, competing and not always friendly companies. As the business continues to develop, and the telephone is used for communication over longer lines than at present, the advantages of having large territories and distant points controlled and managed by a single company, with its executive department at a great commercial center like Boston, will become more apparent. The consolidation took effect as of the first day of October, 1883, but, practically, the new company took direction and control of the business about the middle of November, 1883.

In December your company acquired and brought under its license, the property and lines of the Cheshire County Telephone Company and the Pioneer Telephone Company, at a cost of $24,000 for the former, and $28,800 for the latter, which was paid in capital stock at par. The company now owns licenses for all telephonic purposes in the entire territory included in the States of Maine, New Hampshire, Vermont and Massachusetts, except as follow:

In New Hampshire, the exchanges at Plymouth and Laconia; in Vermont, the counties of LaMoille and Washington, and part of Windham and Bennington Counties; In Massachusetts, the counties of Barnstable, Nantucket, Dukes and Bristol, part of the county of Plymouth, and so much of the territory of Massachusetts as is included in a radius of fifteen miles from the City Hall at Providence, R. I. This territory is divided into twenty four divisions, each under the management of a superintendent. There are 109 exchanges in operation; with which there are connected 472 towns and villages. The number of exchange subscribers connected on the 1st day of October, 1883, was 16,533, number connected April 1st, 1884, 17,826, of which 2,200 are agency, showing that the net gain in six months in the whole territory had been 1,293, or a fraction over 215 per month. The period covered by this eport has been one of great depression and uncertainty in business of all kinds, men have been disposed to economize and avoid entering upon new enterprises, or to extend those already undertaken, and to keep their money idle, waiting to see what the future might bring. In the face of this state of facts, and considering, also, that the telephone business is not exempt from the influences which affect all other commercial and business affairs, the increase of sub scribers has been satisfactory.

PREVIOUS TO THE CONSOLIDATION

the Boston exchange had been owned and operated by the American Bell Telephone Company. This territory has always been considered very valuable for telephonic purposes. The American Bell Telephone Company believing that in the near future the whole or a greater part of the New England States would be included in a single company, and that Boston would be the natural telephonic center of such a company, had declined to dispose of this territory until such consolidation could be effected. For this reason, and for the further reason, that its energies were mainly and necessarily devoted to the management of its interest covering the entire country, the American Bell Telephone Company had not given the same attention to the telephonic development and growth of Boston as had been done by the sub-companies in other cities. The result was that Boston had a very much smaller number of telephones in proportion to its population than any other large city in New England, or perhaps in the country. The new company will now reap the benefit of this in the future growth of the business in the chief city of its teritory. What this growth will be may be inferred from the following facts:

On the first day of April. 1884, Portland, Maine, with a population of 33,810, had 727 subscribers; Lowell, with a population of 59,485, had 959; Worcester, with a population of 58,295, had 784; Springfield, with a population of 33,340, had 588; Concord, N. H., with a population of 13,886, had 210; Boston division with a population of 261,949 had 2,386, including 495 in what is known as the "express system." Taking the five cities of Portland, Lowell, Worcester, Springfield and Concord, N. H., the average number of subscribers, omitting fractions, is one subscriber to every sixty of population. Upon this basis, Boston would have 4,365 or about 2,000 more than it has at present. With the same attention to the exchange service in Boston that has been given in the other cities mentioned, we may reasonably expect the same growth. When you consider, also, that Boston is a great commercial center and that the use of the telephone, as a commercial and business necessity, is now becoming to be fully appreciated and understood, it does not seem to be an extravagant expectation that in a very few years Boston will have 5,000 subscribers to its exchange system. And Boston is not the only territory in which a large future growth may be expected. In the five cities mentioned the growth will be slow, but in many large cities and towns surrounding Boston, such as Cambridge and Charlestown, and in many of the divisions in other parts of the territory, telephonic development is small, and a large increase may be expected. As evidence of this it may be mentioned that in the month of March the Cambridge, Somerville and Portland divisions, having a smaller population, made a larger net increase than the city of Boston.

THE GROWTH OF THE SYSTEM.

There has been a steady growth, also, in other branches of the business There is an increasing inquiry for private lines for long distances, as for example between Lowell and Boston, and between Worcester and Boston. Several of these lines are now in operation, and as the service continues to be improved and patrons appreciate the advantages of such a line for commercial purposes, the income from this source will be largely increased. There are now on hand four or five appplications for such lines from Lowell and Worcester.

At the time of consolidation the Boston exchange had one principal office at 40 Pearl street, with branch offices at Warren, Brimmer and Berkley streets. The office at Pearl street was not large enough to accommodate the increasing business, having reached its maximum switching capacity. It was necessary to find new quarters. A lease has been made for ten years of more commodious offices at the corner of Franklin and Pearl streets. Multiple switch boards, for the new offices are now being connected up, which will have a capacity for 4,200 subscribers. The Berkley street office, which was poorly adapted to the business, and having room for about 200 subscribers has been closed and an office has been opened near the corner of Tremont and Berkley streets, where from 12:0 to 1500 subscribers can be well cared for. The office at Brimmer street, which was poorly located, has been closed and the subscribers connected with the Tremont street office. When completed there will be facilities in the Pearl street office, and our branch offices, for at least 6,000 subscribers, which would seem to be all that it is necessary to look forward to at present. The new switches at the Pearl street office, and changes at the other offices will cost about $25,000. Everything being put into the new offices is of the most approved pattern, and will make the Pearl street office one of the best in the country. We have put about four miles of fifty wire cables, and shall run into the new office with cables for all wires which are more than 500 feet long.

DAMAGE BY FIRE AND STORM.

Saturday morning, January 12th, a fire in the Boston exchange destroyed all the wires running from the switch-boards and connections between tables, so that it was necessary to replace every wire running from the switchers to the structure on the roof, besides a large portion of the office wire in the operating room. By working continuously night and day, all subscribers' lines were in working order Wednesday night following.

The cost of repairs and loss of rentals was about $8,000. But by far the most serious drawback to your business during the quarter, were the heavy sleet storms, which occurred February 27th, and 29th. The storm of the 27th was confined to the Boston District, and was by far the most severe storm that has ever occurred in New England, so far as its effects upon telephone wires were concerned. The storm of the 29th extended from forty to fifty miles west, and fifteen to twenty miles east. Wires,

poles and structures were carried down in every direction and your system was very badly crippled. The larger part of the trouble was on structures and poles two or more years old, which were very lightly built and overloaded with wires. The work of repairing this damage was slow and expensive. The weather was very bad, rain and snow continuing to fall nearly every day for the succeeding three weeks, and it took about this length of time to restore our service to a satisfactory condition. The cost of repairs on this account will probably exceed $5,000; but the work has been done in a substantial manner, and another storm even as severe would not occasion like damage. It is intended, before next winter, to have your plant in such condition that should another such storm occur, the damage and interruption would be comparatively light.

Since last October entirely new apparatus has been placed in the exchanges, at Springfield, Lynn, Manchester, N. H., and Holyoke, and these offices are now in excellent condition. With few exceptions the exchanges of the company are equipped with the best machinery known.

CONSIDERABLE COMPLAINT IS BEING MADE

on account of the overhead wire system. The great multiplicity of these wires in a large city like Boston is a source of considerable annoyance, and the question, "What shall be done with them?" has, particularly within the last year, exercised the minds of telephone men, city governments and legislative committees. There would seem to be two remedies—either to run them under ground, or to collect them in aerial cables, carrying from fifty to one hundred wires each. For the last four or five years numerous experiments in these two directions have been going on in this country and in Europe, and, without going into details, the general result may be stated as follows:

It has not yet been demonstrated that telephone wires laid under ground for any considerable distance can be made to work satisfactorily; the aerial cable system is practically a success, and is being adopted in the large cities, and particularly in Boston, as rapidly as the nature of the business will admit. It is the intention of the managers, wherever practicable, to use cables, thereby relieving the roofs of the great mass of wires and unsightly structures. Whenever the question has been raised before city councils or legislative committees, a statement of the progress of experiment and the constant efforts of telephone managers to remedy the evil has been satisfactory, and has prevented hasty or unfriendly legislation.

In the matter of adopting cables, good progress has already been made. One mile of aerial cable has been put up in Worcester, and about half a mile in Springfield, which has greatly improved the service in those places, besides materially reducing repairs and maintenance expenses.

In Worcester, Springfield and Manchester, and in several suburban towns of Boston, pole privileges in the streets have been obtained; some inferior house-top lines have been replaced with substantial pole lines, providing for a large growth in the future. Considerable more of like work will be done the coming year. The relations of your company with various city authorities are generally satisfactory. There ought to be built the coming year at least 370 miles of new extra-territorial lines, and entirely rebuilt about 90 miles now in use. In Boston and the suburban cities and towns there ought to be built 15 or 20 miles of stout pole lines, and in other cities and towns 20 or 25 miles.

The average cost of construction per subscriber, including trunk, extra-territorial and toll lines, was $51. It is not intended to charge anything to construction that is not an actual and substantial addition to your property. Everything pertaining to reconstruction, the repair of damages by fire or storm, or the maintenance of your property in a first-class condition has been charged to the expense or reconstruction account. This accounts for the small average cost of connecting each subscriber. The report of the treasurer, herewith submitted, shows that the gross earnings of your company for the six months ending March 31st were $412,463.24. The expenses for the same period were $275,587.91; the net earnings, $136,875.33. The operating expenses were 66 8-10 per cent. of the gross earnings. Out of the net earnings one dividend, amounting to $73,395, has been paid. The current liabilities of your company are a floating debt of $100,922.71; a contingent liability consisting of collections in advance for service of $33,487.63; unclaimed dividend, $185,000; total, $134,595.34. As against this there is: Cash in treasury, $16,819 55; accounts receivable, $77,699.17; supplies and material on hand, $61,699.56—a total of $156,218.28. During this period there has been expended for new construction $66,393.98.

The increase of gross earnings for the quarter ending March 31st, over the quarter ending December 31st, was about $15,000, each month showing a handsome gain exclusive of rebates due to the disasters of January and February.

That, under the unfavorable circumstances set forth above, your property should show any increase of revenue, speaks in the strongest way for the future prospects, but at the same time makes the results unreliable as a basis for estimate of the future.

IN CONCLUSION,

your directors have had under consideration, during the past quarter, the best policy for the company to adopt respecting new construction and extension. Whether they could be stopped, and, if so, whether it would be a wise policy to adopt, and, if continued, the best method of providing the necessary funds. The unanimous conclusion was that it would be impossible, as well as unwise, if possible, to stop extension and construction; that it was unwise at the present time to attempt to raise funds by the sale of Treasury stock, of which there is nearly $1,200,000 available; that it was better to use the net revenues of the company until such time as the stock was marketable at its value than to bond the company and borrow money. Before deciding, however, to take a step that would result in the stoppage of dividends, your directors consulted with as many of the individual stockholders—including many of those holding small blocks—as possible, and, finding that these individual stockholders concurred almost unanimously with them, the dividend due in April was passed.

The amount of stock outstanding March 31st was	$10,394,600
Of which there is held by trustees for the company	231,000
Leaving net outstanding	$10,163,600

Dividends are payable, if any are declared, on this stock as follows:

July 1st, 1884	$5,895,600
October 1st, 1884	6,615,600
January 1st, 1885	7,215,600

and thereafter an additional $600,000 on each January 1st until all stock issued participates in dividends. These dividends are, of course, those paid out of the earnings of the quarter immediately previous to the dates given.

There is no reason to doubt that the increase in exchange earnings will continue, and that of extra territorial lines will largely increase during the succeeding quarters of the year. Your revenues will show an increase also from the following causes: The average receipts per subscribers for exchange service is but $3.66 per month, which is the minimum rate. This is caused by outstanding contracts at less than standard rates. As these contracts expire and renewals are made, there will result an increase, not only in gross, but in net revenues.

It would be unwise upon the unsatisfactory data at command to give you any estimates of the future; if made, they would be more of the nature of guesses than estimates. The requirements of your company for the current year, ending December 31st, 1884, for extension and construction, are estimated as follows:

New subscribers, estimated 2,000	$100,000
Extra territorial lines, 370 miles new and 90 rebuilt	70,000
Underground-work in Boston	50,000
Total	$220,000

It is believed that your net revenues will not only take care of this, but will also enable a substantial reduction of the floating debt to be made.

Respectfully submitted, for the directors,
THEO. N. VAIL, President.

Statistics of the Telegraph Lines of Central America.

Costa Rica has had a line between Puntarenas, its Pacific port, and the capital, San Jose, since about the year 1866. Within a few years the capital has been connected by wire with the Atlantic port, Limon; and in July, 1879, communication with their neighbor, Nicaragua, was established. There are about twenty offices in the republic.

Nicaragua has about twenty-five offices. The lines were built in 1875. Tariff 20c. for ten words. All of the principal cities and towns are in the circuit, including the two Pacific ports, San Juan del Sur and Corinto, and the Atlantic port of San Juan del Norte, or Greytown. The lines are about 500 miles extension in all.

The Central and South American Telegraph Company have a cable station at San Juan del Sur, which affords Nicaragua and Costa Rica communication with the world.

Honduras has in operation 1,800 miles of wire, with about forty offices. A network radiates from the capital, Teguci-gal-pa, connecting the Atlantic and Pacific ports of the republic, as well as the principal towns. The tariff is 25c. between all offices. These lines were begun in 1877, under the superintendence of Mr. Maury, formerly superintendent of telegraphs in Salvador. Mr. Eusebio Toledo is the present superintendent. He is a native of Guatemala, where he learned telegraphy under Mr. Stanley McNider.

Salvador was the second of the Central American republics to employ the telegraph, having commenced its network of wires in 1870, under the administration of President Duenas. The first lines were built by Chas. H. Billings, an American, followed by Stanley McNider, of this city, in 1871-2. The service is extended to every town of importance in the republic, and connects with that of Honduras and Guatemala. Tariff 25c. There are over sixty offices. The head office is in the capital, San Salvador. The superintendent is Guillermo Padilla, a native of Salvador, and one of its first operators. There are about 1,200 miles of wire in operation.

The Central and South American Telegraph Company's cable has its most important Central American station at La Libertad, the post nearest the capital. This station gives to Salvador, Guatemala and Honduras their means of electrical communication with the rest of the world.

GUATEMALA.—The first line was built in 1873 by Stanley McNider, of Montreal, along with the lines since constructed, comprising 1,200 miles of wire, with sixty offices, connecting the Atlantic and Pacific ports with all of the important towns. Four lines run from the capital, Gautemala—one to each point of the compass.

Projected Submarine Cable Route, with Approximate Distances.

BY F. N. GISBORNE, *Superintendent Dominion Telegraph and Signal Service.*

England—Sable Island, including slack and 100 miles connection with Nova Scotia	2,450
Sable Island—Bermuda, including slack	1,000
Bermuda—Jamaica, including slack and 200 miles connection, via Bahamas	1,100
Ireland - Forteau Bay, Canada, including 200 miles loop to New Brunswick	2,350
Scotland—Iceland	400
Ireland—Greenland	840
Greenland—Charles Island, Hudson's Straits	850
Charles Island—Port Churchill, Hudson's Bay	850
	9,840
Pt. Simpson, B. Columbia—Unimak, Aleutian Isls	1,200
Unimak—Alton, Aleutian Isls	760
Attou—C. Lopatka or Northern Japanese Isls	650
Cape Lopatka—R. Amoor, Russian Asia	500
Total cable distance, Gt. Britain to Russian Asia, via Canada, including 600 miles slack	6,350

—Canadian Electrical News.

The Institute of Electrical Engineers.

At the meeting of the Institute on Tuesday evening the constitution and by-laws, substantially as reported by the committee, were adopted, and the following board of officers elected: For President: Norvin Green. For Vice-Presidents: A. Graham Bell, Charles T. Cross, Thomas A. Edison, Geo. A. Hamilton, Chas. H. Haskins, Frank L. Pope. For Managers: Charles F. Brush, William H. Eckert, Stephen D. Field, Elisha Gray, Edwin J. Houston, C. L. Hillings, Frances W. Jones, Geo. B. Prescott, W. W. Smith, W. P. Trowbridge, Theodore N. Vail, Edward Weston. For Treasurer: Rowland R. Hazard. For Secretary: Nathaniel S. Keith.

The Governor and Council of Maine have assessed the following taxes against telegraph and telephone companies for the current year:

	Valuation.	Taxation.
Maine Telegraph Company	$ 50,000	$1,250
Western Union Telegraph Co	100,000	2,500
Great Northwestern Telegraph Co	20,000	500
Eastern	18,000	450
International	50,000	1,250
American Union	5,000	125
Atlantic and Pacific	5,000	125
National Bell Telephone Company	75,000	1,875
American Bell Telephone Co	8,000	200
Beady & Linscott's Telephone Co.	450	11

TELEGRAPHIC

.... It is estimated that for renewals alone 750,000 insulators are used every month in this country.

.... In the year ending June 30, 1871, Western Union transmitted 10,000,000 messages. Eight years later it was sending 25,000,000 messages a year—a gain of 15,000,000 messages. Four years later, or for the fiscal year ending last June, the company transmitted 40,000,000 messages—a gain, also, of 15,000,000 messages, but made in half the time the previous like gain was accomplished.

.... The Bankers and Merchants' Telegraph Company has, during the past eight months, extended its system from 295 miles of poles and 1,955 miles of wire to 6,697 miles of poles and 46,847 miles of wire. Additional extensions are under contract which will give the company control of 10,000 miles of poles and about 100,000 miles of wire. The Bankers and Merchants' now cover the territory from the Atlantic to the Missouri river, and from the St. Lawrence river almost to the Gulf of Mexico.

.... Still another Atlantic cable scheme is on foot. Copenhagen capitalists have already come forward with their support towards a telegraph line that will bring Iceland and Greenland into direct communication with Great Britain and America. It is proposed to start from Thurso, in Scotland, from there to run to the Faroë Islands, and from the Faroë Islands to Iceland, and from Iceland to the west coast of Greenland, from whence it dips southward to St. Lawrence Bay, striking the American continent finally at Gaspé Harbor. The total length of the cable is to be 3,150 miles. The longest section will be less than 900 miles, and on that account it is anticipated that it will do the work of any two of the cables now uniting Europe and America.

.... The editor of the *Canadian Electrical News* has in his possession a piece of the white paper that ran through the first Morse instrument at Baltimore, on the first public line built, running from Washington, D. C. It is two feet six and a half inches long, torn nearly straight off at each end, and is one and a half inches wide. The raised Morse characters run directly across the center, from one end to the other, and were transmitted by the hand of Prof. S. F. B. Morse, the father of the telegraph, on the 28th day of April, 1846, from Washington, D. C., to Henry J. Rogers, who was receiving operator at Philadelphia, Pa. The telegraphic characters are well embossed, clear and easily read, and would indicate that the professor had been a fine operator. The translation is part of a telegram from Secretary of the Treasury Bibb to Mr. H. S. Rogers, and reads as follows: "P. M. Yours received. I never doubted friend Rogers' politeness or his disposition. All is O K."

.... The Baltimore and Ohio Telegraph Company now has upward of 25,000 miles of wire, and will have completed by the end of this year 15,000 miles more. It now connects New York, Chicago, St. Louis, Louisville, Cincinnati, Washington, Buffalo, Albany, Cleveland, and the intermediate points on the Baltimore and Ohio Railroad and branches, and the West Shore and Nickel-Plate roads. It is building from St. Paul, Minneapolis, and other important points in the Northwest, and from St. Louis to New Orleans and Galveston, and proposes to make direct connections between Pittsburgh and Buffalo, Pittsburgh and Cleveland, Columbus and Indianapolis, Cincinnati and Chicago, Chicago and St. Louis, St. Louis and Kansas City, and St. Joseph and Atchinson. When these extensions are completed, its lines will reach from Boston and points further East to the principal commercial centers of the United States, not including, however, the extreme West, or the Atlantic coast cities south of Maryland.

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THOMAS H. DELANO, - - - - Publisher.

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EDITORIAL ANNOUNCEMENT.

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We invite correspondence from Electricians, Inventors and the Telegraph and Telephone fraternity on matters pertaining to electrical and scientific subjects, and all facts of special interest in connection therewith.

We extend to manufacturers of electrical apparatus an invitation to send to this office any and all facts concerning their business which will be of interest to the public. We make no charge for publishing news.

Subscribers can at any time have the mailing address of their paper changed by sending both old and new address.

NEW YORK, MAY 17, 1884.

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Mr. Frederick Grant's connection with banking has proved as humiliating and unfortunate to himself as was his connection with electric lighting to those who had the misfortune to allow themselves to be associated with him. His turn has come.

Mark Twain has been studying up the telephone, and says he thinks he understands it pretty thoroughly now, but adds that he would hardly dare to undertake to set one up for himself, lest he should "get some of the ohms in the wrong place."

The Assembly of this State has passed the Senate bill on the subject of underground wires, and it is probable that it will receive the Governor's sanction before this reaches our readers. It provides that unless the wire companies put their wires underground before November 1, 1885, the city shall do it for them. The city will have a nice time.

On another page will be found the full report of the New England Telephone Company directors, submitted to the stockholders at the annual meeting, held in this city on Monday of last week. It contains much that will be of interest to all who are in any way connected with the telephone business, whether as stockholders, officials or employes.

A Chicago company is about to undertake a new venture. It has received rights of way along the Illinois and Michigan Canal for a pneumatic tube eighteen inches in diameter to run from Chicago to LaSalle, a distance of over one hundred miles, with way stations at Joliet, Lockport, and other points. It is to be used chiefly for the transportation of grain, either in bulk or in packages, and the projector claims that he can get up a speed of a mile a minute.

It was the genial general manager of a certain telephone company, who was taken to task concerning the high capitalization of a good many of the companies holding licenses from the A. B. T., and especially as to the liberal "watering" of the stock of his own company. "Well," he answered, "the fact is that the parent company wanted 'the earth' and took it, so that nothing was left for us but water."

Had the State of Florida been provided with an electric headlight there would, in all human probability, have been no collision. We venture the assertion that the steamship line that will adopt electric headlights, so that not only may the ship be seen, but that those on the lookout can see far ahead, just as the engineer of a locomotive can see a long way down the track, will have the preference over others which stick to the old red and green lanterns on the quarters.

"Singular as it may seem," observes the Boston *Transcript*, "the telephone has been the best friend of the telegraph. Just as the elevated railroads in New York increased street travel, and made the horse railroads more profitable, just as electric lighting educated the eye to light and largely increased the consumption of gas, and just as the use of the telegraph increases the postal revenues, so the telephone has educated the whole country to a more liberal use of all methods for quick communication, and has very largely increased the telegraph revenues."

Many public libraries are kept closed in the evening, the very time when they would be of the most service, because so many of their patrons cannot avail themselves of the privileges offered during the day. This is because the managers feel that the introduction of gas would bring on an element of danger which the extra public convenience would not offset. Here is an opening for the incandescent light. It is absolutely safe as to fire, and it possesses many other advantages for use in a room in which many people are congregated. As a light to read by and study by it stands head and shoulders above anything known.

We have had a number of communications concerning our article of week before last on the use of copper wire for telegraphic purposes. It seems to be generally admitted that, for the same conductivity, copper is cheaper than iron, and that it can now be made of sufficient tensile strength to answer all requirements, but our attention has been called to the fact that the process for getting this tensile strength robs it of a portion of its pliability, and that it will not bear as much twisting and bending as iron wire. This renders a special form of joint necessary, and makes it somewhat difficult to take down a line once up and establish it elsewhere. But the great advantage of no deterioration from the elements, and consequently of no loss of conductivity, is not questioned.

An inspection of the "apparatus" used in schools shows that, as a general thing, it is very little improved over what was used ten or fifteen years ago, and that, in the department of electricity especially, there has been a marked failure to keep pace with the progress that the science has made. A reasonable full set of implements for demonstrating the various phenomena of frictional electricity will be found in almost every case, but little or nothing with which to practically illustrate those of galvanic electricity, especially those discovered within the past decade. As it has turned out that frictional electricity is of but little practical use, while galvanic electricity has become man's most useful and obedient servant, it would be well if the sets of apparatus in schools could be overhauled and so augmented as to be available for demonstrating at least the rudiments of the science as it is known to-day.

It is reported that Mr. Edison is about to introduce a new "arc" system. It is hard to reconcile this with what Mr. Edison has said in the past about the arc light, but it may be true. If so, of course he will carry his wires underground. It will be remembered that he has said over and over again that arc light wires ought to go underground, and that there was no good reason why they should not be put there. By the way, why is it that Mr. Edison puts his conductors for his incandescent lights overhead in so many of his village plants? Is it not just barely possible that it is because in his village plants the conductors are so small, owing to the small number of lights, that they *can* be strung overhead, and that in the case of large plants, with the conductors, if the current is to be carried any considerable distance, are too large to go overhead, the burying of them is a matter of necessity rather than of disinterested virtue?

The police report that the very general use of the burglar alarm by business houses, banks, and other institutions has had a very depressing effect on the regular business of professional burglars. The trouble is that they do not know which establishments are protected and which are not, and the dread of unconsciously giving an alarm which will bring the police down upon them in the midst of their work makes them pause. With the number of wires in the air at present it is impossible for them to determine whether a given store is covered or not, and as to finding a wire and removing it, that of itself sends in an alarm forthwith. And so, especially as warm weather is approaching, the professional burglar turns him away from the uncertainties of city life, and hies him to the smaller cities and towns, where, if the prizes are less alluring, the burglar alarm system, with its central office and corps of officers, is not known.

ELECTRICAL INVESTMENTS.

Considering the universal shrinkage in values that has marked the course of the stock market during the past two years, the wonder is not that many electrical stocks have shown a depreciation, but rather that so many of them have stood up as well as they have, indicating a confidence in this class of securities which the general market does not participate in. Although but few electrical stocks are listed so that operations in them are not matters of daily record, it is certain that the number of investors in securities of this class is daily increasing, and that the feeling is abroad that the profitable use of electricity in all directions is destined to grow very rapidly in the immediate future. Moreover, it is felt that the world has but made a beginning in the uses of electricity; that the work of the thousands of inventors who have turned their attention to it is surely destined to bear abundant fruit in the form of discoveries and inventions, which will cheapen the production and application of electricity, and make it available for practical and profitable use in many ways not now thought of.

The fact that the arts which depend upon the use of electricity are practically all in their infancy is a matter that is to be taken into careful consideration in considering the future of electrical stocks. The senior on the list, although it is younger than men of middle age, is the electrical telegraph, and its experience in the matter of public confidence may fairly be taken as a sample of what new enterprises have to contend with. When once Prof. Morse had successfully worked his line between Baltimore and Washington, the feasibility of rapid and accurate communication between distant points by electricity was *settled*—just as much settled as it is to-day. But only a very few took any active interest in the fact, a fact which has had more than any other one agency to do with the rapid development of this country. Looking back, one would say that men of ordinary intelligence ought to have foreseen plainly enough that nothing could prevent the telegraph's coming into general use, and that anybody ought to have considered it a favor to be allowed to invest in it in those days of small things. But men's hindsight is apt to be far more searching than their foresight, and so it chanced that the future of the telegraph, as pictured by Morse, whose only mistakes, as the event has proved, grew out of not being sufficiently sanguine, was looked upon as the dream of a visionary person of questionable sanity. They let the enterprise severely alone, capitalists put their money under lock and key, and thanked Heaven that they were not fools enough to intrust it to a parcel of deluded enthusiasts who thought they could harness the lightning which Franklin had caught and make it do their bidding.

To come down to times a good deal more recent, it seems as though any man might have foreseen that the telephone was bound to come into general use, and that when the original shares—they gave seven for each of them afterwards—were offering at from $20 to $30 each, a man of average intelligence ought to have been smart enough to take a few. But they didn't. But when the new stock had been issued and began to climb, *then* they saw the point, and *then* they bought.

We come now to the electric light, which has been made the subject of the most violent opposition, not only because it was new, but because it interfered with established interests, which thought they saw in it a formidable and dangerous competitor. The fight against it has been prolonged, stubborn and costly, and its opponents have repeatedly resorted to the most unworthy methods to carry their point. But meantime it has steadily grown, and the public, at first unwilling to look with favor upon it, at last insists upon its use. It has been greatly improved and cheapened, it is being more rapidly introduced than ever before, and that it is to become the basis of an established and lucrative business is an assured fact.

So it certainly will be with other applications of electricity. They will be ridiculed first, then opposed, then fought vigorously. But all the time they will be making their way; all the time more and more people will be learning their value and use; all the time the circle of those who look upon them as favorable and desirable investments will increase; and at length what was at first an experiment will become a legitimate and established business.

This much may certainly be said: As things look to-day, no securities offering, or likely to offer, present more solid inducements to investors than those which represent electrical enterprises, provided they be established on a sound basis and managed on business principles.

"THE GOOD OLD TIMES."

We recall a visit made some years ago to an old-time merchant, who did not take kindly to the modern way of doing things. "In old times," he began, "when I imported a cargo of indigo, I first sent out bills of exchange to pay for it; my agent bought it, and sent me the bills of lading. When it arrived I paid the freight and duty, had it put into a warehouse, went down and looked at it, took a sample home to try, and really felt that I owned it. Then I began to look about for a customer, and really got as much pleasure out of the business as I did profit. But now everything is changed. A broker rushes in here to say that he has an offer of so much for a cargo of indigo for delivery three months hence, and that a cable from Calcutta tells him that it can be had for so much, showing a profit of so much. 'Shall he close for my account?' He doesn't even sit down, but just stands there, waiting for me to say 'yes' or 'no.' I say 'yes,' and he is off. The next day my clerk makes out the papers, I sign them, and that's all I know about it until the broker's check comes in for the profit, less his commission. I never see the indigo or the customer, or anybody else; and there's no fun or satisfaction in the business, anyway."

This incident, which showed so clearly the difference between the old point of view and

the new, was recalled to mind the other day by a discussion heard between two partners on the question of putting a telephone into the office. The junior advocated it, but the senior was opposed to it. "The fact is," said the latter, "that it is a source of constant interruption; it breaks in upon you at times when you don't want to be disturbed; it brings a lot of people into your office, and, although it may sometimes be convenient, it is a good deal of a nuisance. We have got along without it so far, and I don't see why we cannot get along without it hereafter," and with this he settled himself back in his chair to hear the junior's rejoinder.

"Well," said the latter, "I don't know but what I am a good deal of your way of thinking myself. When I was a little chap, our village was the nicest, quietest, cleanest place you ever saw. Everybody knew everybody else, nobody was in a hurry, and everything was done in a quiet and dignified way. But a little later on they put a railroad through the town, and then the trouble began. There was dirt and dust and danger, and I remember how frightened the folks were lest I should get on the track and be run over. A lot of new people came to town, bought land, and put up houses. It wasn't long before they had a hotel, and, next thing we knew, there was a factory started right near the depot. Then, because they didn't think the old ones were good enough, the town bought a piece of father's land to build a new schoolhouse on; and, although they paid him more than the whole place cost originally, so that he could fix up the old house and make himself and mother more comfortable than they ever dreamed of being, it did seem as though the outside world had invaded our homes and rights. I was down there last summer, and, if you'll believe it, they've turned the old 'common,' that was nothing but a cow pasture, into a 'park,' with trees and lawns, and an iron fence; and they've got a high school, and a public library, and a ——"

"John," said the senior, who began to see the point, "have that telephone put in; and," he added, turning to the writer, "for heaven's sake don't give this away."

CONCERNING BATTERIES.

It may fairly be questioned whether electricians have been wholly wise in turning their attention so fully to dynamo machines as a source of electricity as to very largely exclude batteries from their experiments and investigations. We know that it has been assumed that the day of the battery has gone by, that it is necessarily and inevitably expensive as a source of electrical energy, that it is uncertain, variable and constantly unreliable, and that, except for certain specified purposes for which as at present developed it is quite sufficient, it is useless to think of employing a battery depending upon chemical action for its energy. But notwithstanding this, we are satisfied that the day is not far distant when batteries will be used with comparative economy for electric lighting on a small scale—and small scale lighting, when once made practicable, will foot up an enormous aggregate—and also for actuating small motors of sufficient capacity to drive sewing machines, small lathes, printing presses, and even small boats and wheeled vehicles. That these things can be done by battery power no one for a moment questions, but that they can be accomplished with anything approaching economy everybody seems to doubt. For this very reason—"everybody" being usually wrong—it is worth while devoting a good deal of thought and time to the subject, to see whether some of the barriers to success cannot be obliterated. It is worth while to study the battery in all its forms with a view to getting it into the smallest possible compass and the smallest possible weight for effective works. It is worth while to study it with a view to producing just the character of current desired at the lowest possible price. It is worth while to study the form of motor best adapted to battery use, one that will yield the largest possible equivalent for the energy developed, and it is well worth while, by way of encouragement in the work, to see how large would be the demand for a reasonably economical motor and a reasonably economical incandescent light, both for domestic use, and neither constituting a part of a general "system," even if the one cost more than gas, and the other more than the fractional part of a horse-power employed would come to at current rates. The man who has a wife not over strong would be very glad to get a motor to save her the labor of running her sewing machine, even if the cost of maintenance was somewhat high. The number of actual running hours would not be very large in the course of a year, the cost would certainly not be *ruinous*, and the saving in health would be something that couldn't be figured in dollars and cents. In fact, as things now are, the alternative is to hire some one to come in and run the machine, and that, what with wages, food, and wear and tear of nerves, is a good deal more costly than the most cantankerous battery possibly could be. Again, many a mechanic has a lathe in his shop which is not in steady use, which is run an hour or two a day at the outside. To drive it by foot is exhausting. Power from an engine is not available, nor would it be taken if it were, because it would not pay to hire it for occasional use merely. But a battery and a motor, if they could be afforded for a reasonable price would be a welcome adjunct, and, although the running cost per hour might be high, the actual expenditure would not necessarily be so heavy as to be burdensome.

Of course it will be said that this ground has all been gone over, that to produce the necessary illumination the filament must be raised to a certain degree of incandescence, that to effect this it must have a certain resistance, and that to overcome this a current must be employed which a battery cannot generate with sufficient economy. But there are a number of links in this chain of reasoning, and it is not certain that they are all strong. Who knows that some new filament may not be produced which will offer materially less resistance and still be raised to brilliant incandescence? Who knows that improvements in the effectiveness of batteries do not await the patient experimenter? In a word, who is there that is authorized, and, being authorized, has the temerity to pronounce the word "impossible?"

THE "BLOCK SYSTEM" IN ARC LIGHTING.

In the event of legislation which would prevent the running of electric light wires overhead, some device must be resorted to which will get around the difficulty. Of course, those who are ignorant of the difficulties in the way will howl in chorus, "Go underground!" but it is never worth while to waste valuable time in listening to the ignorant. You cannot pump water out of a dry well, and you cannot extract information from a brain that does not possess it. Given that the public will not do without the arc light, that the interests involved are too important to be sacrificed, and assuming that legislation will step in to prevent wires from crossing streets, how is the problem to be solved?

We believe that the use of arc lights by commercial houses is destined to very greatly increase; that on business thoroughfares in all our large cities the firms which make use of it to a greater or less extent, either inside or out, or both, will outnumber those which depend wholly on gas, and, in a word, that where one arc light is used to-day, ten will be used a decade hence.

It is in this increase in light that we think we see the solution of the difficulty, so far as the lighting of business premises is concerned. When a block of buildings which now has ten lights in all comes to require fifty or one hundred, it will pay the lighting company to locate a plant there, just as it pays the district messenger, telegraph, and telephone companies to establish branch offices. There is scarcely a business block in any city in the Union, in which steam cannot be found and had at a price. The hiring of a room big enough to hold an engine and from two to four dynamos would cost money, but it would be partially offset by the saving in original cost and the maintenance of long lines of wires; and the man who ran the engine and machine at night could see to carboning the lamps during the day and keeping his circuit in order. The wiring would all be inside, there would be no need of structures of any kind, and the machines, working over short circuits, would operate to the best possible advantage.

It would doubtless be found in some cases that a single block would not afford a sufficient demand for lights to warrant the establishment of a local plant for its sole use. In that case it would be neither difficult nor burdensomely expensive to run a small passageway under the street into a cellar in the next block, which, thus reached, could also be lighted. In fact, it is a question whether it would not be wiser to make the local station in all cases large enough for four contiguous blocks, connected one with the other in this way. Power is carried from block to block in many cases in the lower portion of the city of New York, and the system is found to work well.

It may be asked what would become of street lighting by electricity were such a system adopted. The answer is that in the vicinity of blocks equipped as described there would be no difficulty, but that in other parts of the city there would be no lights. If the people, acting through their representatives in the legislature, determine that no wires shall be carried overhead, they practically determine that there shall be no general system of street lighting; but, fortunately, it is out of the power of those to whom they entrust law-making authority to determine that there shall be no electric lighting of private premises.

In the city of Chicago no electric-light wire is allowed to cross a street, and yet there are few cities in the world which can show more arc lights. The business has been done in a helter-skelter sort of way, mainly by isolated plants bought and owned by firms or individuals, and there is no unity in it. We believe that a company which would undertake to exploit the city of Chicago on the "block system," could and would soon establish a large and very profitable business.

Good Advice All Round.

To the Editors of the Electrical Review:

I am an ardent friend of the telephone—believe in it thoroughly—use it many times every day, hardly know what I should do without it—and yet I have suffered no end of annoyance from the unequal service which it has rendered me. These annoyances led me to make the acquaintance of the manager of the exchange to which I am a subscriber, and to his courtesy I am indebted for the insight which I have gained into the workings of the central office, from which I have been able to understand and appreciate many of the difficulties in the way of an uniformly good service, which daily and hourly present themselves, and must be overcome to accomplish the desired result.

Some of these, such as the breaking of the wire by which the subscriber is connected with the central office, which cuts him off completely, so that he neither can reach or be reached by the central office, or the crossing of the subscriber's wire with another, by which his line becomes "grounded" (I think I have used the right term), producing a like result, are difficulties which frequently present themselves; the result of accident which cannot be provided against, as far as I have been able to see, and for which the exchange should not be held responsible, unless, upon notice, it does not take steps to promptly repair the damage. It is no more to be censured than is a railroad company for a train failing to arrive at its destination on schedule time in the face of a heavy snow storm, broken bridges, and the like; or, than a telegraph company for the prompt delivery of a message when all its wires to the point of destination are down.

But there are difficulties other than those arising from unavoidable accident which stand in the way of an uniform service, and it is particularly of some of these that I wish to speak.

In my company—I mean the company with which I am connected—and I presume the same rule is pursued by all exchanges where more than one operator is required, each operator is placed in charge of a certain number of subscribers' wires, say one hundred—the idea being that she (our operators are ladies) can give reasonably prompt attention to that number during the busiest hours of the day. The operator has not only to answer the calls of the subscribers which are connected with her board or table, but also to do the "switching" necessary to connect her subscribers with the subscribers on other boards or tables when called upon to do so. It will readily be seen that an operator, no matter how expert, can answer but one call at a time. This, in the busy hours, causes delay in answering subscribers' calls. This, while it might be reduced by increasing the number of operators, and that would probably make the service cost us more, could never be entirely removed, unless an operator was assigned to each subscriber to provide against the contingency of every subscriber calling at the same time. Such a provision would of course be out of question entirely.

Delay is often caused by the subscriber failing to inform himself of the number of the party with whom he desires connection, also by conversation with the operator, with whom he has no business other than to say, for instance, "Please connect No. 1 with No. 5." The picture of a conscientious operator trying to be courteous to such a customer! while the "drops," are falling right and left, indicating that she is wanted by other subscribers, is a painful one, and the subscribers kept waiting from such a cause would pity rather than condemn the operator if they knew the facts.

Delays are also caused by subscribers failing to respond promptly when called. These difficulties in the way of good service are beyond the control of the exchange, and can only be remedied by the subscribers themselves. All operators are not conscientious in the discharge of their duties. Some allow their attention to be drawn from their work and indulge in an occasional chat with an associate or a subscriber, during which calls are unheeded; or, with their minds occupied with other matters, they pay but indifferent attention to subscribers' requests. For this difficulty, if it can be so called, the exchange is directly responsible, and it has the power and the means to remedy it by an exercise of care in selection of operators; by careful instruction in their duties, by keeping a watchful eye over their actions, and by having a few operators in reserve to take the places of those temporarily incapacitated by illness, or who prove unmindful of their duties.

Managers should be ever ready to lend a willing ear to all subscribers' complaints, to apply such remedies as each case requires, and to help their subscribers to a better understanding of the business and their relations to it.

Subscribers should be encouraged to make complaints, which should be explicit as to date and circumstance, and made promptly.

It is only by the co-operation of subscribers, operators, and managers that good service can be obtained. Each has a duty to perform. *I mean to do mine.* LAYMAN.

"Reform is Necessary."

To the Editors of the Electrical Review:—I chanced to see a copy of your paper containing some criticism of the way our Providence Telephone Exchange is run, and want to thank you for it. I am a subscriber here, am in the habit of using my telephone more or less every day, and what you say corresponds exactly with my experience. I get so tired and irritated standing and waiting for an answer, not knowing whether I have been heard or not, since it is very seldom that the operator repeats to me the name of the party I have called for, that I have sometime been tempted to order the telephone out entirely. I hope that the people in the office here will see what you said and profit by it. "Reform is necessary."

WEYBOSSET.

(*Continued from page 4.*)

view—not only in that of cleanliness and economy, but in the more important one of health—of electric lighting will receive that important consideration which its just merits demand.

Allusion has been made to the use of the Van Depoele electric light in some of the largest mercantile establishments in this city, and it is only just to say that it has given such eminent satisfaction that the proprietors of these establishments would not dispense with it for any consideration. By its brilliancy and great steadiness, the merchant who desires to complete his purchases during the busy seasons of the year in the evening, is enabled to do so with as much accuracy as in broad sunlight. All colors are as easily distinguishable one from the other by the electric light as they are in the sunlight, which is certainly one very great advantage in their favor. The electric light, owing to its high temperature, produces rays of every degree of refrangibility, and therefore, as an illuminating power, it is equal to that of the sun. But gas light, owing to the lowness of the temperature, is deficient in blue rays, and is therefore not so effective in discriminating colors as the electric light. In the arc system, which is usually used in all large building, it is not necessary to exclude the atmospheric air from contact with the carbons, or electrodes, as they are sometimes called. Arc lights are, therefore, burned not only in the hotels but in the open air. They are far brighter than incandescent lights, and on this account are preferable, and are usually surrounded by a globe of ground glass in order to lessen the intensity of their glare. The Van Depoele arc light has won great favor wherever it has been introduced. The time is probaly not distant when this light will come into wide and more extended use in this city.

The Van Depoele Electric Light Company is a Chicago institution, and was incorporated April 25th, 1881, with a capital of $1,000,000. It purchased the patents and franchises for the United States of the Van Depoele Electric Light Company, which had been organized in the City of Detroit, Michigan, about one year before. Its present Board of Directors is composed of some of the best business men of the City of Chicago, and is on a most substantial foundation. The directors for 1884 are: Aaron K. Stiles, president Western Fence Co., Chicago; W. H. Turner, of Turner & Ray, wholesale leather and findings, Chicago; Frank Douglas, manufacturer of iron and wood-working machinery, Chicago; E. H Carmack, assistant manager Continental Life Insurance Co., Hartford, Chicago; Albert Wahl, capitalist, Chicago; Chas. J. Van Depoele, electrician, Chicago; J. W. Calkins, president Thorn Wire Hedge Co., Chicago; Louis Wahl, of Wahl Brothers, glue manufacturers, Chicago; Caleb Clapp, of Clapp & Davies, wholesale jewelers, Chicago; Joseph A. Sleeper, of Sleeper & White, attorneys, Chicago; W. A. Stiles, secretary and treasurer Thorn Wire Hedge Co., Chicago. Its present officers are: Aaron K. Stiles, president; E. H. Carmack, treasurer; Theo. P. Bailey, secretary; Chas. J. Van Depoele, electrician; Thomas S. Sprague (Detroit), counsel; Joseph A. Sleeper, attorney.

The company own the Van Depoele patents for the United States for electric lights and power. As to the matter of the economy of electric lighting, it has been so thoroughly discussed through newspapers, magazines, pamphlets and manufacturing associations in Europe and America, and so well settled in favor of electric light, that it seems but little more can be said, and a waste of time to reiterate what has already been stated.

The Van Depoele Electric Light Co. occupy a spacious building at the northeast corner of Van Buren and Franklin Streets, where all their lights and machinery are manufactured. The building is five stories high, and every foot of space is utilized in the conduct of the business. They are daily extending their business to all parts of the United States, and their system is one which challenges the closest examination and investigation. It is a high compliment to the company to say that, wherever their system of lighting has been introduced, it has given the most unqualified satisfaction, and hundreds of testimonials might be produced to show the great favor with which their lights have been received. "In this age of progress the experiments of yesterday are the necessities of to-day. The electric light is no longer an experiment, and can be truly called a necessity; and, like the steam engine, locomotive, telephone and telegraph, seems to us absolutely indispensable. Its utility, economy and healthfulness have been fully demonstrated all over the world. The lightning being harnessed proves more tractable than steam. Young America has the reins, and, until some faster steed is found, will not be left in the race."

We are indebted to the courtesy of our enterprising contemporary, the *Western Manufacturer*, of Chicago, for the foregoing description and illustrations of this apparatus.

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Notice.

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Average Market Quotations of Battery Supplies for the Week Ending May 17th, 1884.

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ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING MAY 6, 1884.

298,020 Laying underground electric wires; Joel H. Page, Philadelphia, Pa., assignor of one-half to Blanche Carrie King, same place.

298,030 Automatic electric copying and engraving machine; Albert Schmid, Zurich, Zwitzerland.

298,072 Insulating material; Daniel H. Dorsett, Chicago, Ill.

298,073 Rheostat; John Doyle, Hoboken, N. J., assignor to himself and C. Coles Dusenbury, White Plains, N. Y.

298,080 Electric bell and annunciator; John D. Gilchrist, Ishpeming, Mich.

298,121 Automatic electric circuit-closing device; Charles T. Ross, New York, N. Y.

298,130 Electric motor; Levi W. Stockwell, Cleveland, O., assignor to the Cleveland Electric Motor Company, same place.

298,141 Method of testing carbon conductors for incandescent lamps; Edward Weston, Newark, N.J., assignor to the United States Electric Lighting Co., New York, N. Y.

298,142 Holder for incandescent lamps; Edward Weston, Newark, N. J., assignor to the United States Electric Light Company, New York, N. Y.

298,143 Socket for incandescent lamps; Edward Weston, Newark, N. J., assignor to the United States Electric Light Company, New York, N. Y.

298,144 Electrical circuit breaker; Edward Weston, Newark, N. J., assignor to the United States Electric Light Company, New York, N. Y.

298,175 Galvanic battery; Charles L. Clarke, Manchester, county of Lancaster, England, assignor to the Domestic Electrical Manufacturing Company, Boston, Mass.

298,205 Secondary electric clock; Ida C. Himmer and William F. Weissgerber, New York, N. Y., assignors to said Ida C. Himmer.

298,242 Electric annunciator; Paul Seiler, San Francisco, Cal.

298,243 Mechanical telephone exchange; George F. Shaver, Erie, Pa., assignor to the Consolidated Telephone Company, of New Jersey.

298,286 Telephonic transmitter; Henry Clay, Philadelphia, Pa., assignor to the Clay Commercial Telephone Company, same place.

298,301 Circuit closer for electric clocks; Vitalis Himmer, New York, N. Y., assignor to Ida C. Himmer, same place.

298,325 Incandescent lamp; Edward Weston, Newark, N J., assignor to the United States Electric Light Company, New York, N. Y.

298,326 Electric circuit connector; Edward Weston, Newark, N. J., assignor to the United States Electric Light Company, New York, N. Y.

298,327 Incandescent lamp fixture; Edward Weston, Newark, N. J., assignor to the United States Electric Light Company, New York, N. Y.

A printed copy of the specification and drawing of any patent to the annexed list, also of any patent issued since 1865, will be furnished by any of the patent solicitors whose advertisements appear in this journal. In ordering please state the number and date of the patent desired.

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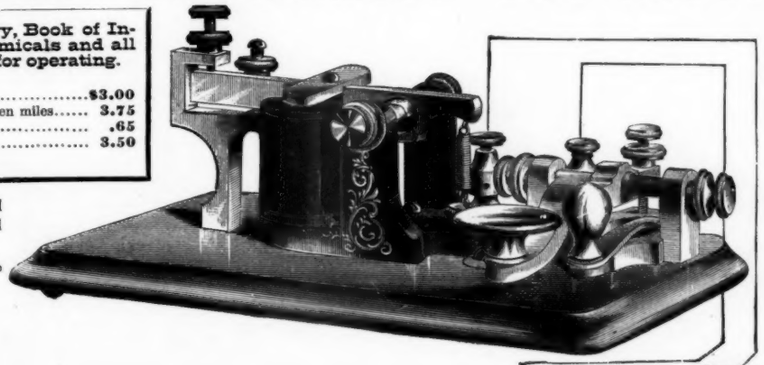

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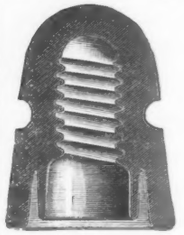
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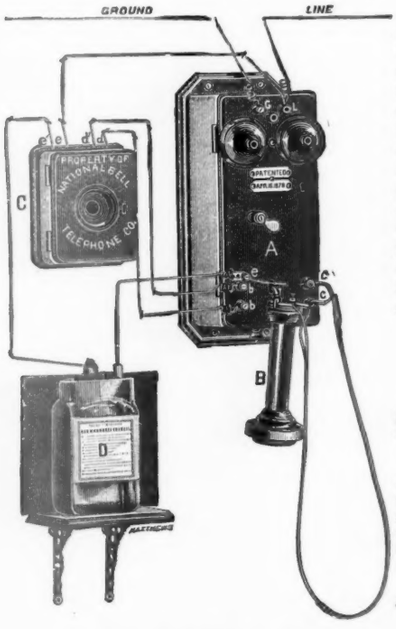

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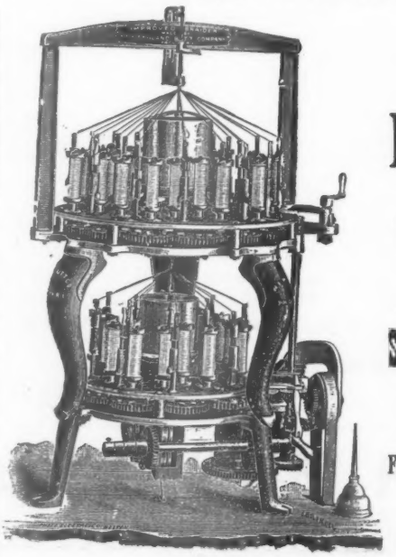

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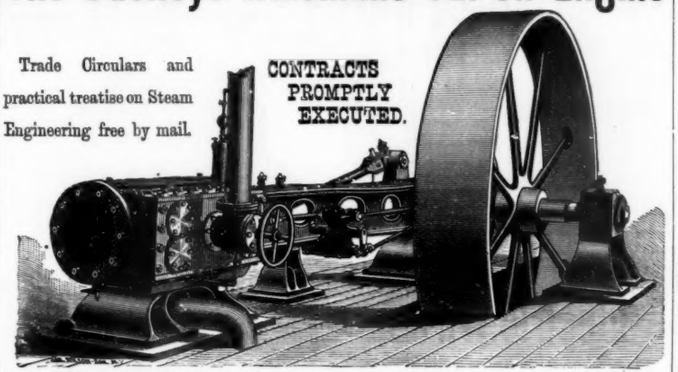

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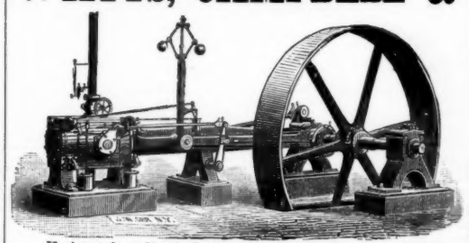

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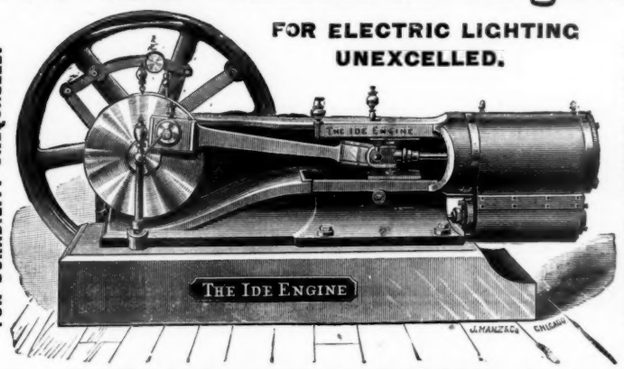

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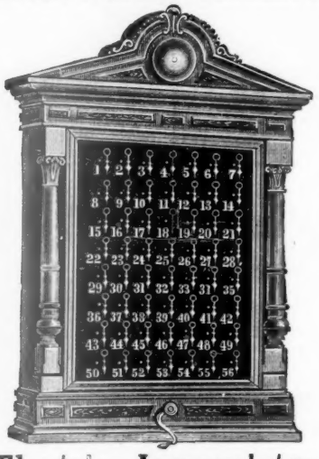

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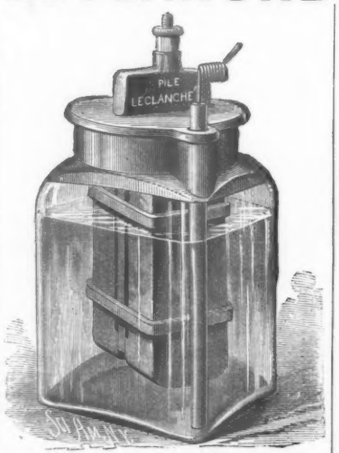

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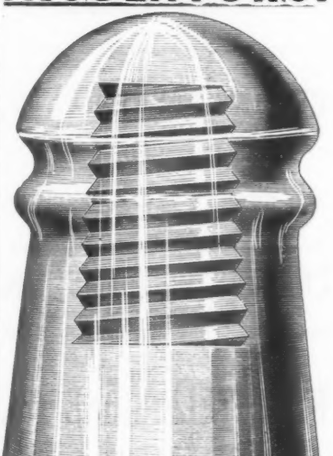

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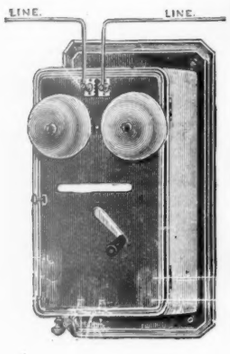

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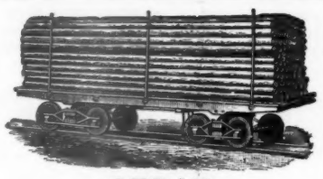

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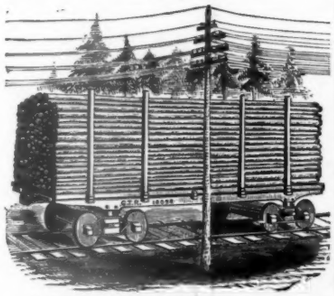

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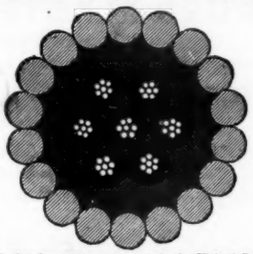

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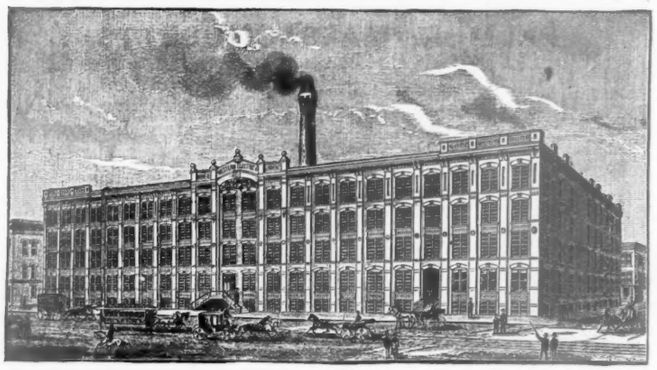

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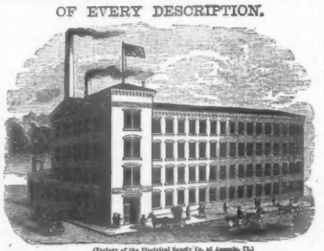

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